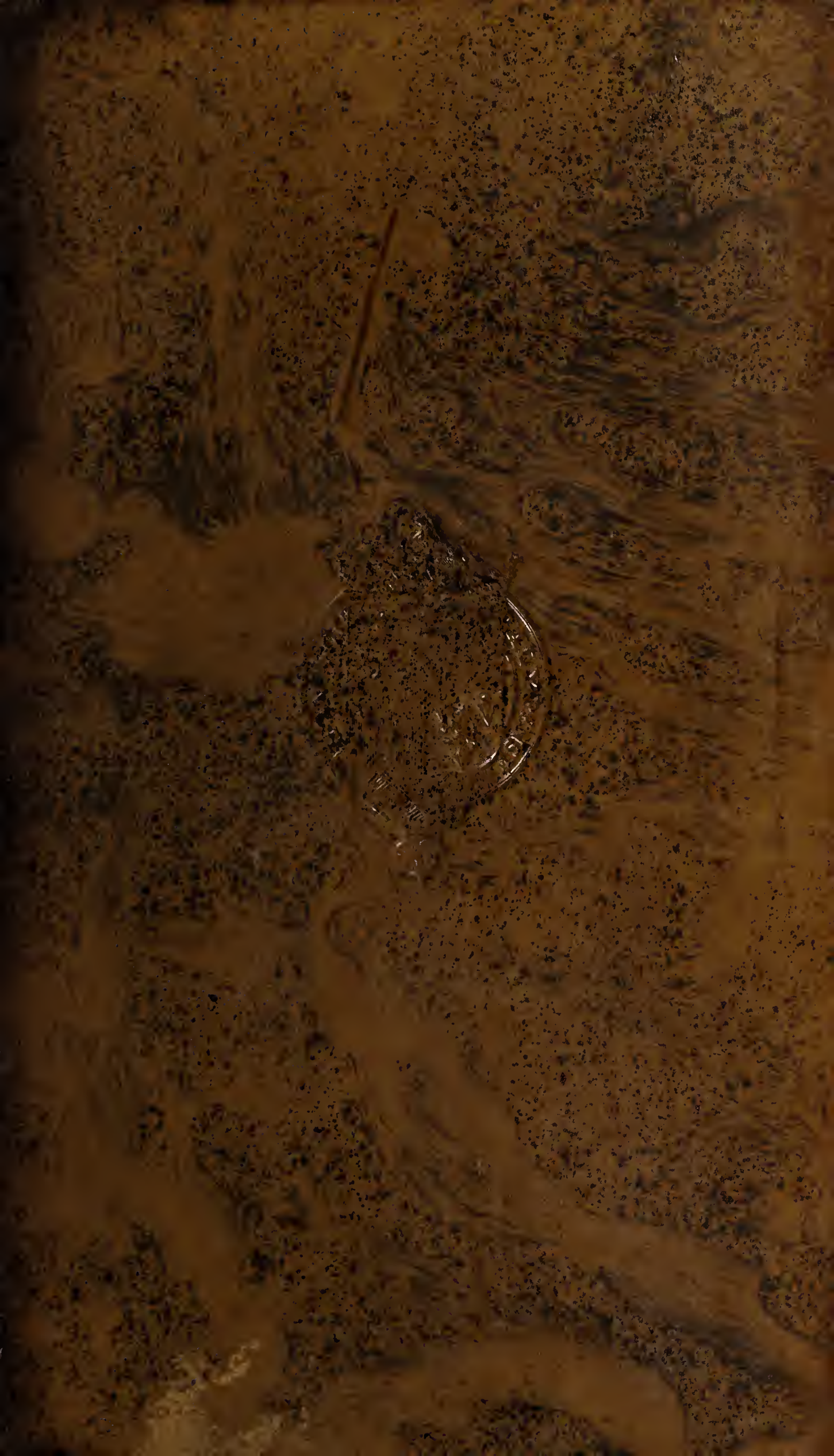

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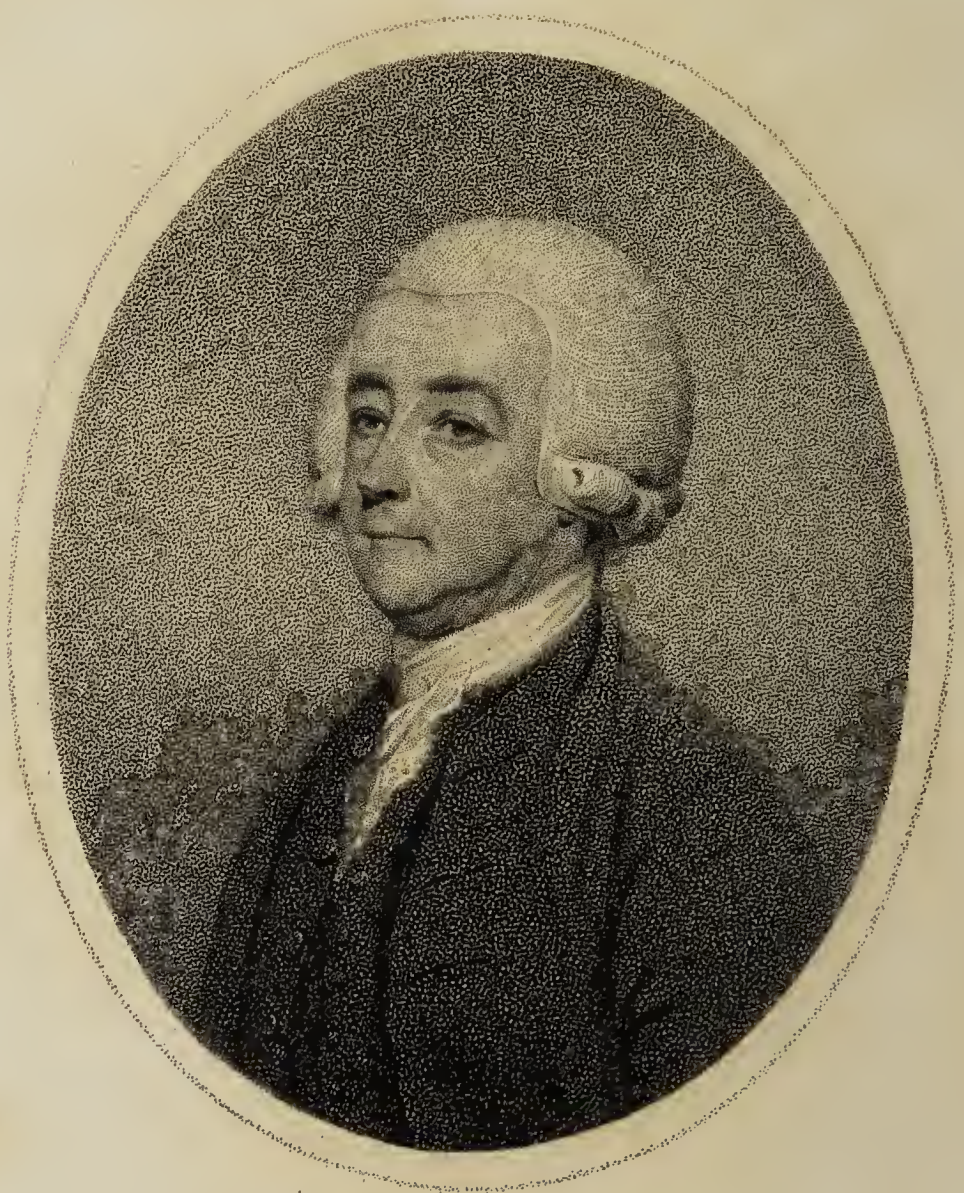

OWEN SALUSBURY BRERETON Esq.r

F. R. & A. S.

late Vice-President of the Society for the Encouragement of Arts, Manufactures & Commerce

Engraved by H Cook, from an original Miniature furnished by the late John Holliday Esq.r

16766

TRANSACTIONS

OF THE

SOCIETY

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, and COMMERCE;

WITH THE

PREMIUMS offered in the YEAR 1801.

VOL. XIX.

LONDON:
Printed by W and C. SPILSBURY, Snowhill.

Sold by the REGISTER, at the SOCIETY'S HOUSE, in the ADELPHI; and by Messrs. ROBSON, J. WHITE, BECKET, JOHNSON, CADELL and DAVIES, ELMSLEY and BREMNER, WALTER, RICHARDSON, SEWELL, and TAYLOR.

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PREFACE.

THE views of the Society instituted at London, for the Encouragement of Arts, Manufactures, and Commerce, extend, independent of their domestic regulations, to general improvements in Agriculture, Chemistry, Polite and Liberal Arts, Manufactures, Mechanicks, and the products of our Colonies. On examining the Communications which compose the present Volume, it will be found that the Society have been occupied, during the last Session, in each of the above-mentioned Departments; and it is hoped the Public will derive useful information from each distinct Class.

Before a regular detail is entered into of the numerous Articles of which this

Volume is composed, it may not be deemed improper to pay a tribute to the memory of the late Owen Salusbury Brereton, Esq. by inserting the following particulars of his life, communicated by the late John Holliday, Esq. F. R. S. O. S. Brereton, Esq. whose portrait is annexed to the Frontispiece, long took a lively and active part in the concerns of the Society, as one of their Vice-Presidents. He was the son of Thomas Brereton, Esq. of the County Palatine of Chester, and was born in the year 1715: he received his education partly at Westminster School on the foundation, partly at Trinity College, Cambridge; and, on the death of his father, inherited the ancient family-estates, in the above-mentioned county, and in Flintshire.

In 1738 Mr. Brereton was called to the Bar, and in 1746 became Recorder of the great and flourishing town of Liverpool; which office he filled with great

great impartiality and dignity during fifty-two years. In 1796, on his proposing to resign, the Corporation requested him to retain his situation, and appointed a person to discharge its active duties.

Mr. Brereton became a Member of the Society of Arts so early as 1762; and by his assiduity, zeal, and order, filled the distinguished office of Vice-President with great credit to himself and advantage to the Society, from March 1765 till his last illness in 1798. He was also an early Member of the Royal and Antiquarian Societies. The Archæologia of the latter, contains his Observations on Peter Collinson's Account of the Round Towers in Ireland;* his Tour through South Wales;† his Extracts from the Household Book of Henry VIII;‡ his Account of a painted window in Brereton Church, Cheshire;§

* Archæol. ii. 80. † Id. iii. 3. ‡ Id. iii. 154.
§ Id. ix. 368.

and that of a non-descript Coin, supposed to be Philip VI of France.* Mr. Pennant has also, in his Welsh Tour, described and given an engraving of several Roman Antiquities, found by his horse accidentally disturbing them, at a Roman station called Croes Atti, on his estate in Flintshire.†

Mr. Brereton was a Bencher of the Honourable Society of Lincoln's-Inn, filled the office of Treasurer, and was Keeper of the Black-Book. He also represented the borough of Ilchester in Parliament. He took the name of Salusbury with an estate, and became Constable of the Castle of Flint, a valuable privilege to his adjacent possessions. His domestic happiness was manifest to his numerous and respectable acquaintance, among whom were some of the most learned men of the age.

Mr.

* Archæol. x. 463.

† Pennant's Tour, Vol. i. p. 52, 54, 67, 73.

Mr. Brereton died on the 8th of September, 1798, in the eighty-fourth year of his age, and was interred in St. George's Chapel, Windsor. His wife was sister of Sir Thomas Whitmore, K.B. Mr. Brereton lived happily with her more than fifty years. They had five children, who all died young; he bequeathed the rents of his estates to her during her life, and after her decease (which happened in 1799), to his relations; the only son of the late General Trelawney, of Soho-Square, and the second son of the Rev. Sir Harry Trelawney, Baronet, of Trelawne, in Cornwall.

The Premiums usually proposed by the Society have, during this Session, undergone a minute investigation: several are discontinued; and many, relative to objects in Planting, Husbandry, &c. offered, for some succeeding years, in the last Volume of Transactions, still remain open to Claimants, until the

times there noted are expired, though not particularised in the present Volume.

Modifications of them, or other Premiums expected to answer the purpose better, will probably succeed them, as occasion may require.

New Premiums will be found introduced, under the Articles *Comparative Tillage; Rotation of Crops; Preserving of Turnips, Cabbages, Carrots, Parsnips, Beets, and Potatoes; inventing Thrashing-Machines; manufacturing Tallow-Candles; Preparation of Tan; Preparations of Red and Green Colours for printing on Cotton-Cloth; artificial Ultramarine; Stroke Engravings; Chintz and Copper-Plate Designs for Calico-Printers; Engravings on Wood; Bronzes; improved Ventilation; Cultivation of Hemp in Canada, and curing Herrings in the Dutch method.*

The Society will attend to any informations respecting such matters, as may be proper objects for further Premiums; and

and invite the Public to furnish them with such Communications, addressed to the Secretary.

On perusal of the present Volume, it will be seen that a long detail of Certificates, which formed a considerable part of the former Volumes, has been contracted, in order to admit a greater number of subjects; by which means the present Volume contains twelve more articles of intelligence than any preceding one, all of which it is hoped will be found interesting to the Public.

The Papers and Communications are disposed in the order heretofore observed; a few remarks are here made, in addition to the Accounts introduced, as they follow in rotation.

In the Class of Agriculture it will be found that Henry Vernon, Esq. of Hilton Park, amongst a variety of other Trees, disposed with much taste and judgment, has planted a great number of English Elms, which are likely to form

form good timber. From subsequent accounts we have been informed, that the whole of his plantations are flourishing and picturesque.

The variety of uses to which Osiers are applied, renders their culture desirable. Mr. Thomas Selby, of Otford Castle, in Kent, has made very considerable plantations of them, and much improved Land which was naturally wet and barren.

The very extensive plantations of Timber-Trees, by Thomas Johnes, Esq. of Hafod, in Cardiganshire, demand particular attention. This Gentleman, by his excellent discrimination, and by exertions perhaps unparalleled, has converted a Desert to a Paradise; and in a wild uncultivated part of Wales, has raised such enchanting scenes, as afford inexpressible pleasure to every spectator. Mr. George Cumberland, whose taste and judgment have been displayed in several publications, made the following

observations

observations on seeing Hafod, in the year 1796. "So many are the delights afforded by the scenery of this place and its vicinity, to a mind imbued with any taste, that the impression on mine was increased after an interval of ten years from the first visit, employed chiefly in travelling among the Alps, the Appennines, the Sabine-Hills, the Tyrolese, along the shores of the Adriatic, over the Glaciers of Switzerland, and up the Rhine, where, though in search of beauty, I never saw any thing so fine; never so many pictures collected in one point of view."

Every person will feel a pleasure on being informed that, since the above description, very considerable improvements have been made there, particularly very lately, in the farms; that the additions in this line, and fertilizing Waste Ground, take place every year; that the number of Trees planted on

Hafod

Hafod estate, between October 1795 and April 1801, amount to 2,065,000, of which 1,200,000 are Larches; that, besides the above Trees, fifty-five acres of land have been sown with Acorns, or planted with Oaks; that Mr. Johnes is still extending his plantations, and greatly improving the scenery of his estate. We are told, that the Cheese sold by him the last season, amounted to four tons, and his Butter 1200lbs. He expects his Dairy will furnish him, during the next year, ten tons of Cheese for sale. Mr. Johnes has been indefatigable in his pursuits in Agriculture; and has not only shown, by practice, what may be done, but in a late ingenious Publication, presented to this Society, entitled "A Cardiganshire Landlord's Advice to his Tenants," pointed out to others the means of doing it.

In a climate so variable as that of Great-Britain, it is of importance to know how to counteract the disadvantages

tages arising from unfavourable autumnal seasons. The Account given by Mr. Brown, of Markle, in Scotland, of the Wheat sown by him in the spring of 1800, and the valuable crop housed the same year, is well deserving attention.

As similar disadvantages of climate attend the housing of Crops when ripe, the method of making Clover-Hay in Courland, communicated by Mr. John Taylor, opens to this country a new line of management for this purpose, which bids fair to be of great utility. The process of vegetable fermentation, in the preparation of Hay, has been hitherto little attended to or understood: the consequence of neglect in this point, has occasioned many stacks of Hay to take fire and be destroyed; which loss the method here recommended may probably prevent.

Mr. Palmer's method of Housing Corn in Wet Weather, as mentioned in the present Volume, appears to be scarcely known

known in England, but has been successfully practised in Fifeshire, and other parts of Scotland. The more general introduction of Thrashing-Machines, has been the means of preventing the loss of many crops of Corn in Great-Britain, by affording quick dispatch to the separation of the Corn from the wet sheaf in bad seasons, and (as is proved by Mr. Palmer's experiments) without injuring the quality of the grain.

Immense tracts of Land lie uncultivated in different parts of Great-Britain. As such Land, when once improved, seldom recurs to its orignal barren state, it shows that every improvement of this kind is a source of permanent wealth to the Nation. In few parts of England is the land naturally worse than in the County of Lancaster, or more valuable when improved. In that county, Mr. Fogg, of Bolton in the Moors, has undertaken, with great spirit and judgment, the improvement of a part of a large tract

of

of Waste Land lately inclosed, and has succeeded in the trial with honour and advantage. There is great probability of his example exciting a noble spirit of emulation, for similar agricultural exertions in that neighbourhood. He has also furnished some hints on the propagation of Potatoes, and on the means of preventing a wasteful expenditure of that useful food.

The long continuance of water upon land during the winter season, is perhaps one of the greatest mischiefs that can befall it, and ought most carefully to be guarded against; this has occasioned the adoption of a variety of modes for its removal:—viz. open or covered Drains, made by the spade; Pipe or Tube Drains, made under the surface by Mr. Scott's Mole-Plough; the triangular Indent, ingeniously contrived by Mr. Middleton, as noticed in the Commercial and Agricultural Magazine, and performed by a cart-wheel,

prepared

prepared for the purpose, which presses down the grass sod, and, without destroying the grass, furnishes, by the indent which it makes, a passage for the stagnant water. Each of the above methods may have advantages in particular situations, but probably none of them is more generally useful than the Drain-Plough, of which a Model was this Session presented to the Society by his Grace the Duke of Bridgewater: it performs the operation of Surface-Draining with neatness, ease, and celerity; destroys but little herbage, and furnishes, at a trifling expence, in the following spring, an excellent compost for a top-dressing.

The Drill Husbandry continues to gain advocates; and repeated experiments confirm its advantages.

The Public are under great obligations to Thomas Andrew Knight, Esq. of Ludlow, for a Drill Machine for sowing Turnips and other seeds, presented by him

him to the Society. This very ingenious and useful implement possesses the powers of making an indent or furrow for the seed; of depositing the seed within that channel, and covering it instantaneously in a more effectual manner than can be done by the harrow or rake. Its construction is simple and cheap; and it can be expeditiously worked, on any soil, by a man or boy.

The Society are much indebted to the same Gentleman for some very accurate Observations upon the Nature of Blight, the destructive effects of the Aphis, and the means of obviating the sudden changes to which our climate is subjected, and by which Vegetation is impeded.

Mr. Lester, of Northampton, has introduced an implement, named a Cultivator, which, from its powers of contraction and expansion, may probably be very useful in working rough fallows after ploughed crops, and reducing the

soil to a greater degree of pulverization than can be effected by repeated ploughings and harrowings in the common method.

The advantages of the Drill over the Broad-cast husbandry, in the culture of Turnips, is further elucidated by the Rev. T. C. Munnings, whose paper upon that subject points out a number of minutiæ apparently necessary to the success of the crop; amongst which it is particularly recommended to cover the seed with earth instantly when sown. The method which he suggests for the preservation of Turnips on the land, by means of ploughed ridges, as food for cattle during the winter season, claims public attention. Mr. Munnings has presented the Society with his Drill-Machine for sowing Seed.

Mr. Eccleston, of Scarisbrick, who has for many years been very attentive to Agricultural pursuits, has obliged the Society this Session by his Observations

on a method of Draining Boggy Land; and presented an implement which forms an outlet for water when retained in peat-earth, by the spongy texture of the vegetable surface growing within the ditches.

It was an observation of the celebrated Swift, that "whoever could make two ears of corn, or two blades of grass, to grow, where only one had grown before, would deserve better of mankind than the whole race of politicians." The same remark may be extended, with propriety, to other vegetable products; and the merit acknowledged of Mr. Ashton, of Woolton Hall, who has lately converted one hundred and thirty-three acres of waste sandy land, unproductive of herbage, to a valuable plantation of Timber-trees, the flourishing state of which affords great encouragement for thus employing land apparently barren.

Mr. Edward Jones's Paper on the Destruction of the Grub of the Cockchaffer, contains curious observations on the habits of Moles; and points out the necessity of a cool and candid consideration upon the alternative choice of permitting the increase of Moles, or of suffering from the ravages of the Cockchaffer, worms, and other noxious insects.

The preparation and application of Composts for Manure are of very essential consequence in husbandry; and a knowledge of the modes adapted for such purpose in different parts of Great Britain, is of the utmost importance. Great exertions are necessary to eradicate the topical prejudices on this head which are known to prevail throughout the kingdom, and to encourage methods more efficient for the purpose. In the isle of Thanet, for instance, we observe, that sea-weeds, and even sea-sand, are diligently collected, and attended with great

great advantage to the clay-land on which they are applied; whilst on the coast of Lancashire, and in other parts of England, the same advantages are wholly neglected, where similar opportunities offer for their use. The application of peat-earth and powdered lime, prepared as a compost, were thought improper in the populous district of Bolton in the Moors, for the production of Potatoes, though this vegetable furnishes a principal part of the food of its inhabitants: but the active exertions of Mr. Horridge, of Raikes, have brought this Manure into estimation, and will probably be the means of increasing highly in value large tracts of land in that neighbourhood, at present barren and uncultivated.

Mr. Kirwan, in a valuable pamphlet published in 1796, upon the Manures most advantageously applicable to various sorts of Soils, and the causes of their beneficial effects, grounds his

theory on this simple proposition, " that Manures are applied to supply either the defective ingredients of a soil, improve its texture, or correct its vices."

It is certainly of the first consequence to every person concerned in agricultural improvements, to examine well the different soils, minerals, and natural products, furnished by the adjoining lands in his possession; he will generally find that he may make from them judicious mixtures, and form such Composts as will fertilize the whole.

Under the class of Chemistry, the experiment made by order of General Bentham, shows that the principal reason of Spring-Water becoming putrid at Sea, is owing to its being stowed in wood-vessels, and that this putridity may be prevented by using vessels not likely to be acted upon by water; he has successfully employed, for this purpose, copper tanks well tinned.

The

The Rev. Mr. Cartwright, who hath on many occasions applied his ingenuity and extensive abilities to the public good, has this session favoured the Society with a communication on the subject of the Inspissated Juice of Lettuces, and of the analogy of its effects with the Opium prepared from Poppies.

Under the class of Polite Arts, Mr. Sheldrake has taken much pains to elucidate the composition of the Colours used in painting by the Ancients, and to improve the permanency and brilliancy of those employed by modern artists.

A reference to the Premiums bestowed in the Polite Arts (see page 374) will show the attention paid by the Society to different branches of them. It may be noted with great justice, that some performances were exhibited, which would have done honour to persons of high professional reputation.

The scarcity of the usual materials for making Paper has been a consider-

able impediment to the progress of literature, and called for every possible remedy.

The Paper prepared by Mr. Willmott, from the Paut-Plant, is of good quality, as may be seen by the specimen annexed to the communication.

The manufacture of Chicoree Root, as a substitute for Coffee, has lately extended rapidly over the Continent; and as this article furnishes a considerable part of the nutriment of many thousand persons in Germany, Mr. John Taylor, from personal observation and minute inquiries, has furnished an accurate Account of its culture, preparation, and use, which it is hoped will contribute to the comforts of great numbers of the inhabitants of this country.

In the line of Mechanicks, the Society have been very assiduously engaged, during the whole of their last Session. It must, however, be remembered, that the acting powers in Mechanicks are not

numerous,

numerous, and that it is difficult to make such application of these powers as to produce novelty and advantage. Many Machines laid before the Society have been rejected, owing to their want of simplicity, their not being new, or not adequate to the purposes intended. Great differences will also arise in public opinion, upon the proportion of reward due to the several Claimants, which is frequently rated too much by one person, or too little by another.

The Society have, however, earnestly endeavoured to discriminate with propriety, to do justice to merit, and to encourage every spark of genius, which may lead to real improvement. Wherever they have discovered that the machine produced, though not fully adequate to the object proposed, was likely to lead to beneficial consequences, they have inclined to give encouragement. In the Machines noted in the present Volume, each will be found entitled to

merit

merit in this point of view, and the whole, it is hoped, may lead to improvements in practice.

The Machine recommended by Mr. Sarjeant for raising Water, is of a cheap and simple construction, and answers well the purpose to which it is applied.

The advantage of the Gun-Harpoon is further confirmed, by the distance from whence the three Whales were shot by Robert Hays, which probably would not have admitted a boat to approach so near as to allow the harpooner to strike them by the hand.

From many experiments made before the Committee, with the model of the Water-Wheel from the late Mr. Besant, it appears to possess advantages sufficient to recommend its trial in places subject to Back-Water.

Very strong recommendations of Mr. Phillips's method of driving Copper-Bolts into ships, have been given, independent of the Certificates annexed to his

his Account, and afford great reason to hope it will be of material benefit to our Naval Architecture. The principal difficulty to encounter seems to arise from the prejudice which workmen have in general for old modes of practice, however ineffectual and absurd.

Mr. Arkwright's Machine for raising Ore from Mines, possesses the advantages of supplying itself with the articles to be raised; of lifting them above the surface of the earth, and delivering them into carts attending for them: its motion is simple and regular, and the different parts of the machine are easily kept in order.

The importance of procuring from Quarries in Great Britain, Mill-Stones equal to those imported from France, is obvious. In the last Volume, an Account was given of a Quarry of Burr-Stone, discovered at Conway by the late Mr. Bowes, and one hundred pounds awarded. The present Volume contains

Mr.

Mr. Field Evans's Communication of another Quarry now worked in Montgomeryshire; it is probable that the detached Burr-Stones, found promiscuously in the soil near to this Quarry, will be equal to the French in every respect, as their best Burr-Stones are collected from similar situations.

Mr. Garnet Terry's Mill for Grinding Hard Substances, is free from the friction of the screw, which presses on the grinding cylinder in the common hand-mills, and is more easily regulated.

Mr. William Bullock's improvement of the Drawback House-Lock possesses every advantage of simplicity and effect, and deserves to be introduced into general use, as it prevents the unpleasant noise arising from the common locks, and furnishes additional security to the house.

Where only a small space of ground can be allotted for the use of a Crane, Mr. Gent's Crane may be employed: it has

has the powers of raising a considerable weight, and projecting that weight to a distance proper for loading it.

Sir George Onesiphorus Paul, Baronet, who has taken infinite pains for a long time in the cause of humanity, and in the alleviation of distress, has strongly pointed out the necessity of the admission of Fresh Air into Hospitals and crowded Rooms, and furnished a very satisfactory Account of the mechanical modes of Ventilation, which he has put in practice with success.

Mr. De Lafon's Watch-Escapement displays an ingenious combination of mechanism, which it is hoped will furnish useful hints to persons occupied in that line.

It has long been the earnest wish of the Society that Great Britain should procure, from the produce of her Colonies, such articles as cannot be grown in England, and have therefore been hitherto obtained from foreign Governments.

ments. In the article of Indigo, this point has been for some time accomplished, as upwards of half a million sterling in value has been annually imported from our East-India settlements, for several years past, and this nation rendered independent of Spain for this valuable product.

The Paper furnished in the present Volume, upon the subject of Myrabolans from Bengal, tends to prove, that a valuable substitute for Aleppo Galls may be procured from thence.

Mr. Stephens's Communication on the Lake prepared by him from *fresh* Stick-Lack, yielding a scarlet dye resembling that from Cochineal, notices that upwards of 18,000 lbs. weight of this Lake have been received in England. The experiments made by Dr. Bancroft and others, show that it is at least equal in effect to one fourth its weight of Cochineal. The Society are informed, that great pains are taking in India to produce

duce the best Cochineal; and there is reason to hope that ultimately resources may be found in our Colonies, to supply our wants and increase our manufactures.

The public-spirited and disinterested manner in which this Society, in their last Session, extended their Premiums to Ireland, will doubtless meet with universal approbation, and tend greatly to encourage the patriotic endeavours of this and the Dublin Society, to promote the benefit of the united kingdom.

The very handsome manner in which the Dublin Society have expressed themselves on this occasion, evinces great probability of advantage from these united exertions. A letter from one of their Vice-Presidents, addressed to this Society, contains the following observation:—"It is with no small degree of satisfaction we behold the Premiums of the London Society opened to this country, and we hope that by joint

joint efforts hereafter, our Premiums may produce what individually each might fail in."

The Society take the present opportunity of acknowledging their obligations for the sundry Presents they have received from different public Societies and Individuals, the particulars of which are inserted in the 380th page of the present volume.

It is a pleasure to notice, that the Society flourishes greatly under the public auspices; that nearly two hundred additional Members were elected during the last Session; and that many Candidates are now making application for admission.

It is necessary, particularly, to notice, that the grand Series of Moral and Historical Paintings, in the Great Room of the Society, have been lately greatly improved: through the whole of the last recess of the Society, Mr. Barry has been zealously engaged in bringing

to

to mature perfection those matchless fruits of his talents; nor has his active genius been alone confined to the finishing what was before conceived: he has also created new objects for the *contemplation* of the Philosopher, and *admiration* of the Artist.

A valuable detail of part of these improvements will follow the present Preface; and a further account will probably be furnished to the Public at a future period.

In the last Volume of Transactions it was mentioned, that the Gold Medal of the Society had been presented to Mr. Alexander Mackenzie, for the Discovery of a Passage, over Land, from Upper Canada to the South Sea.

Agreeably to the intimation given in that Volume, his arduous and interesting journey has since been published, with Maps illustrative of his Route.

The Society have commenced the October Session with vigour and spirit; the

ingenious of both sexes, and of every description, are invited to lay before them such objects as are new and important, addressed to their Secretary, Mr. Charles Taylor, at the Society's house in the Adelphi, London. Due attention will be paid to merit in every department of Arts, Manufactures, and Commerce, and it will be amply rewarded by honorary or pecuniary compensations. It is particularly requested, however, that the information sent on the several subjects, where Premiums or Bounties are expected, be full, clear, and explicit. Any gratuitous hints or communications, likely to promote the objects of the Society, will be esteemed a favour, and be properly noticed.

The Society desire it to be clearly understood, that, as a body, they are not responsible for any opinion or representation of facts, contained in the following Papers; and it is necessary to state, that they have admitted the Accounts

counts to pass, in the language and manner of the several persons concerned. They have allowed every man to tell his tale in his own way, and have preferred such plain statements in the language sent, to alterations by the Society in a more embellished style.

The Dublin Society have lately annexed the Premiums of this Society to their publications. Though the funds and government of the two Societies are entirely distinct, yet both being actuated by that noble principle *the public good*, there is a pleasing prospect of mutual success. The efforts of both, as has been before observed, are united for the general welfare; and there is every reason to hope that such powers of exertion will produce a copious source of information and happiness to the world.

The Society have been favoured by JAMES BARRY, Esq. with the following Account of the late additional Improvements made by him in the PICTURES in their Great Room, which were begun in the year 1777 by that eminent Artist.

No. 36, Castle-Street, Oxford-Street,
November 26, 1801.

MR. BARRY presents his respectful compliments to the most noble the President, the Vice-President, and the rest of the Society for the Encouragement of Arts, &c. and having in a letter, dated October 25, 1801, communicated to them his reasons at large for the several matters of recent introduction into the Pictures he has executed in their Great Room, he now, in compliance with the request of their Committee of Correspondence and Papers, offers to them such explanatory

extracts therefrom, as he conceives may be of some use to the Members of the Society, and the Public at large.

Mr. Barry has exemplified his idea for the improvement of Medals and Coins, originally suggested in a letter to His Majesty's Most Honourable Privy Council, dated July 31, 1798 (see Letter to the Dilletanti Society, p. 218, 8vo. edit.) by introducing into the Picture of the Society two models for Medals or Coins; the one, a more than profile female head, with the imperial shield of Great Britain and Ireland suspended from her shoulder; the other, a head of Alfred, the great improver and founder: the latter of which he adopted from necessity, not from choice, as he had no portrait of his present Majesty with which he was satisfied. He was particularly desirous to shelter this improvement under the wings of the Society, as he thought it probable that the noble relievo, and the security of that

relievo

relievo exemplified in those heads, would be imitated in our coinage; and, from its obvious utility and dignity, be adopted all over Europe: and, in an object of such importance as the conservation of the portraiture and inscription, two points of the highest *desiderata*, the lead would be taken by a Society which has given rise to so many others, and has been so long remarkable for its exemplary, patriotic, and philanthropic conduct.

As the suggestions in the former letter to the Privy Council were delivered generally, without the specification of those minute particulars necessary for the execution of Mr. Barry's ideas, the person who executed the new Halfpenny and Farthing, issued shortly after, entirely misconceived Mr. Barry's idea of the proper convexity, or of the cavo bed in which it should have been raised; the spirit had evaporated in his ill-managed experiment, and there was nothing remaining but a *residuum*, a mere *caput*

mortuum of little value, by which one important part was unnecessarily sacrificed to the other, and consequently nothing desirable obtained, but rather the contrary ; as the head, which ought to be most important and principal, is flat, and without relievo, and triflingly buried in the centre of the coin, like a mite in a cheese, in order to allow space for an unnecessarily mischievous circle of large letters, which might have been so well disposed of in another manner, according to the usage of the Greeks. Nay, even in the halfpenny and farthing of George II. the head, as it should always do, importantly fills the coin, and the circular inscription is even so contrived as to be subservient to that end.

If the contrivance visible on the slightest glance at those models had been adopted, the fine heads on the Grecian and Roman coins, those of the Hamerani's on the Papal medals, or

those

those admirable ones executed by Hedlinger for Sweden, though now so liable to injury from their bold and noble relievo, as to be exposed to speedy ruin from time and usage, might preserve their most essential parts from being injured until those parts, which were least essential, had been entirely worn away. Thus, too, one of our current half-crowns of King William, or Queen Anne, had they been executed in this way, would have gone through many centuries, and from the wearing would be hardly worth a shilling, by the time the likeness and inscription, the two most essential parts, came to be injured. It is worth remarking, that those of the Grecian and Roman coins which are preserved in the collections of the curious, are not those which were in constant use, but those which, from the superstitious notions of the time, were buried while fresh with their dead, in order to satisfy the demands of a certain grisly Ferryman, or any other

that

might occur in their long and gloomy journey, or from some other accidents or calamities; all the rest which were subject to the vicissitudes of current usage being obliterated ages ago.

The better to elucidate these two models, Mr. Barry introduced an aged figure stooping over them, looking very intently on a medal, and holding in his other hand a letter or paper on which is written, " On the gousto of Medals and Coins, and the best mode of preserving them from injuries by friction," the identical wish expressed by the Privy Council to the Royal Academy, and which produced Mr. Barry's letter before referred to. On the same paper is also introduced the necessary section of such a coin.

These ideas Mr. Barry had the honour of submitting, immediately after their introduction into the Picture, to the Right Honourable the Earl of Liverpool, in a letter dated July 3, 1801.

It

It may be well, before closing these remarks on Medals and Coins, to take notice here of a very curious and extraordinary particular, which occurs in those coins that are supposed to be the most ancient, and are placed amongst the *incognita*, as they are without mark or inscription of any kind, which might denote time or place, and are no less remarkable for the transcendant excellence of their style of highly-cultivated design and execution than for their extraordinary and perfect preservation, which is owing to their great relievo, and to the rising of the metal round the sides of the square coffers in which they are bedded, like the roses in the architectonic soffita's, and the hieroglyphics on the Egyptian obelisks. A few of those most extraordinary and unaccountable of all numismatic remains may be found in Dr. Hunter's truly noble collection; and, as far as they go, for a female head and its kerchief or accompaniment, they are

but

but rarely (if at all) equalled even by the Greeks themselves, either Asiatic or European, or their Sicilian or Italian colonies. These Coins have all the simplicity of the Egyptian bas-relief, but without its bald uniformity, or the petite, wirey, husky, dry, cutting manner of either the Persian, Hetruscan, or Punic Coins. They exhibit a venustas and unrestrained easy, urbane, graceful deportment, which appears equally to have resulted from the high cultivation and amenity of the state of society where the artist found his models, as of the delicacy and ability with which those models were imitated. Herodotus (in Clio) says, " that the Lydians were the first of all the nations we know, who introduced the art of coining gold and silver to facilitate trade, and first practised the way of retailing merchandize." This perhaps is the reason why these Coins are supposed to be Lydian, as they are evidently prior to the Greeks,

and

and appear to have been imitated in the Grecian settlements of Ionia; and yet the Greeks seem to have had no Coins in Homer's time, as he does not any where allude to them: and it is difficult to bring one's self to believe that the remarkable perfection of these coins could have been effected by the Heraclidæ, who were settled in Sardis, admitting these Heraclidæ to have been the descendants of that Grecian Hercules, the friend of Philoctetes, so memorable in the Trojan war; and that the Greeks before and in Homer's time could have been such strangers to coinage. It is difficult also to reconcile with the sum of things, the names of Belus, and his grandson Ninus, which occur in the list of these Heraclidæ: so many difficulties start up on every side, as would induce one to look for a higher origin of these Heraclidæ, the supposed inventors of Coinage; and instead of Hercules the friend of Philoctetes, to substitute the Titannic Hercules,

cules, the friend and relation of Atlas, who flourished many ages before. This would comport better with the highly-cultivated gusto of those Coins, so completely estranged as they are from all the different modes and degrees of barbarism of the surrounding nations. They stand insulated like that mundane system of Pythagoras's importation, and cannot be ascribed to any known people, except perhaps to these Titans or Atlantides, whence so many other knowledges seem to have been derived as from a common source. But Coinage is not traceable farther back than in this supposed Lydian money, which we find in a state of complete perfection, without any of those previous stages of progressive growth which must incontrovertibly have preceded that perfection.

In order to finish entirely this part of the subject, Mr. Barry begs leave to add, from a letter read by him to the Society, October 25, 1801, that in consequence

sequence of the application for designs for a new die for their Medal, he stated his intention of introducing a modification of their former design, which he thought would fully answer their intended purpose. The more the subject matter of that design is considered, the more one must admire and respect the sterling good sense and weighty consideration of the original Founders of the Society. Nothing can be more happily imagined than the idea consisting of Britannia aided by Minerva and Mercury, the classical tutelary deities of Arts, Manufactures, and Commerce; and this old device, like many other good old usages, cannot be amended by any change in the substratum. It requires nothing more in its essence, and will most happily coalesce and accommodate with all the acquisitions and improvements of the most enlarged and refined culture. For this purpose, a little more of *goût* and character in the figures,

figures, is all that is necessary; enlarging them so as to fill the space with more dignity, and taking away from their individual scattered appearance by the little graces and arts of a more improved composition. And as there is always a considerable dignity and consequence attached to magnitude, which is one of the constituents of sublimity, his suggested alterations would amount simply to this—to substitute, instead of the little entire figures of Minerva and Mercury, only two large heads of those deities; and he would omit the head of Britannia altogether; and by a wreath of the shamrock, rose, and thistle, boldly rising round the edge of the Medal, playing in and out in a graceful gustoso manner, he would represent the present happily united Kingdom of Great Britain and Ireland, with a felicity at least equal to the owl, the horse's head, or the dolphins, on the Athenian, Punic, or Sicilian coins. It may be observed by the way,

way, that this mode of rim, with an enlarged noble head of His Majesty, with the relieved and incused parts gracefully and happily diversified, and the inscription well secured within, would not be unworthy of the Royal Mint.

Another matter which Mr. Barry is happy in offering to the attention of the Society, is a Naval Pillar which he has introduced in the picture of the Thames, or Triumph of Navigation. This design occurred to his mind at the time when his Royal Highness the Duke of Clarence, and other Noblemen and Gentlemen, associated for the purpose, advertised their idea of obtaining designs for a Naval Pillar, or other trophy, which might serve for the commemoration of great national achievements. In consequence, however, of the dark and mysterious opposition which had so long followed him, and of which he has had such frequent reason to complain, Mr. Barry laid aside the design till its con-

 nexion,

nexion with the subject of this picture of the Thames, pressed upon him with accumulated and irresistible force; and finding nothing had been done, which would answer the intended purpose, to his satisfaction, he rolled the scaffold to the picture, and began such a trophy of a mausoleum, observatory, or light-house, as is no where else in existence, and he believes never had existence before. Nothing can have more simplicity and *naïvité* than the idea of it as a totality; the British Tars so well and obviously typified by the naval Gods, the Tritons, upon sea-horses, dashing up the sides of a rock, upon the top of which they erect this trophy to the first Naval Power.

Mr. Barry cannot help pausing to notice the dark designs of interested individuals against his honour, his interest, and his peace; and especially as they have been so managed as to influence the mind of his Sovereign. Amongst

other

other reports equally unfounded, it has been generally said that His Majesty had been induced to believe that Mr. Barry had written the Supplement to Pilkington's Dictionary of Painters, where, page 825, the King is grossly abused. This, had he been allowed the opportunity, he could then, as he does now, have flatly contradicted; and have then affirmed, as he does now, that he had never any part or concern in the writing or devising that Supplement; and that, though his name was impudently and fraudulently affixed to it, yet that he had no knowledge whatever of any such matter, until, in common with the rest of his Majesty's subjects, he saw it, after its publication, with a garbled portion of his Letter to the Dilettanti bound up along with it.—This justification he offered in a Letter addressed to His Majesty, and afterwards inserted in the Morning Post of December 3, 1799. Whether it ever

was laid before His Majesty or not, Mr. Barry is uncertain; but a matter so flagitiously fraudulent he cannot resist every opportunity of denying.

In the year 1792, it appeared that Mr. Barry had occasion to offer another (though much more limited) scheme for a national Mausoleum (see page 28, Letter to the Dilettanti), where the subjects sculptured in the round and in basso-relievo, being all near the eye, afforded to the spectator every opportunity of considering them with convenience, pleasure, and utility, the want of which was so deeply regretted by all who had seen the fine column at Rome, erected to commemorate the victories of Trajan; the greatest part of these fine sculptures being to every purpose of desirable inspection, as much lost and buried in the air, as if they had been so many feet under ground; and the beautiful labour bestowed upon them could never be appreciated but in the

plaster

plaster casts, moulded from them at two different times, and from the prints of Pietro Sancto Bartoli, executed from these casts. No doubt the statue of the Emperor, placed on the top of this column, might, from its magnitude, be less liable to suffer by the distance as a totality, and might be seen all over Rome, which was the grand motive that induced to the undertaking, and would in every respect have been worthy the great artist and most excellent Emperor, had another form of shaft been adopted, which would have admitted of an exterior ascent, like this in the picture of the Thames: then nothing would have been lost in the appreciation of such admirable workmanship, as the bas-relief all the way up. But this had not occurred hitherto in any instance, ancient or modern, except in such where there was nothing of sculptural record to inform as to the subject matter, and to give delight by the dignified, impressive

manner of conveying that information. The column of Antoninus is liable to the same objections as this of Trajan, and still further aggravated by the clumpy, too much detached way of rendering the sculptured groups, which is not less injurious to the general effect, than perplexing and disgusting when considered singly. Of the same nature with these of Trajan and Antoninus is the great column at Constantinople, though, no doubt, from the intervening decline of the arts, greatly inferior in gusto of every kind: and as to Pompey's Pillar at Alexandria, it commemorates nothing, except perhaps by something on the pedestal.

As the Pyramids of Egypt have been contrived, their immense mass seems thrown away, without use, as nothing is recorded on them, either in the universal language of forms, or in those more confined and precarious hieroglyphic or alphabetical characters; and all succeeding ages have

have been utterly unable to divine the utility adequate to such expensive constructions. It may be disputed, whether the Chaldaic Temple of Belus and the tower within it, was of equal antiquity with the Pyramids in Egypt; but, according to the account in Herodotus, this Chaldaic tower was by much a more artist-like performance, and from what will appear below, more appositely convertible to various purposes of the most interesting utility. This Babylonian tower consisted of square bodies placed one on the other. The first body or platform was (to use the words of Herodotus) of one stadium in height, and in length and breadth of the same measure. On this tower another is built, and a third upon that, till they make up the number of eight. The ascent to these is by a circular way carried round the outside of the building to the highest part. We are enabled to form a clear conception of the circular ascent round the several

square stories of this building in Chaldea, by adverting to the account published by the Rev. Father Clavigero, of the ancient pyramidal temples in Mexico and the country about it, which appear to have been constructed with more genius than those of Egypt, and to the great surprise of all who have concerned themselves in matters of antiquity, are found to be constructed after identically the same mode with this of Chaldea, consisting of a certain number of stories, round each of which their processions marched, ascending by a separate flight of steps at the same angle of each.

One of these Mexican temples consisted of nine stories or platforms; others were of a single body, in the form of a pyramid, with a stair-case. The height of the Pyramid of Cholula was, by Clavigero's account, upwards of 500 feet. "One may ascend (says he) to the top by a path made in a spiral direction round the pyramid, and I went

up

up on horseback in 1744." But the architecture of the great temples was for the most part the same with that of the great temple of Mexico, which though of a great height, so as to afford a view of the lake, the cities around, and a great part of the valley of Mexico, and affirmed by eye-witnesses to be the finest prospect in the world—yet, notwithstanding this great height, consisted but of five bodies or stories, perhaps in order to allow space for the plain or upper area on the fifth body, which was about forty-three perches long and thirty broad, upon which they performed their sacrifices in the view of such an immense concourse of people as this great altitude would afford towards their becoming participants in what was going forward. Nothing architectural could have been more ingeniously contrived to exhibit with all conceivable splendor, not only the spectacle on the platform, but also the processional part, moving on

on all sides in every plain as it ascended. But when one reflects that the victims were human, and that 72,344 of them were sacrificed on this platform, in one festival of four days continuance, at the dedication of this temple, it is not to be wondered that the Spaniards demolished, and suffered not a stone of it to remain standing. And yet it had been better, perhaps, to have adopted a different conduct, and to have suffered the temple to remain; and, in lieu of the former horrid butchery, to have performed, in the presence of this misguided people, their own christian, unbloody sacrifice, which, from its relation to the oblation at Calvery of that lamb which was slain from the beginning, had happily atoned for all, and precluded the necessity of any other sacrifice. Such a substitution would there have been evangelical indeed; as almost all over that part of the western hemisphere, islands, and continent, every man had

a chance of becoming an ill-fated prisoner, and consequently one in the dreadful list of victims. But the time presses, and will not admit of much excursion, however agreeable, or even perhaps necessary, towards the just appreciation of certain parts of the subject in hand. Let so much then suffice, as it will sufficiently authorise the observation, that the British Pillar, in the picture of the Thames, possesses every advantage enjoyed in those famed pyramidal, obeliscal, or columnal fabrications of Egypt, Chaldea, Rome, or America, with advantages peculiar to itself, of still higher value than all that it may have in common with those celebrated vestiges of antiquity. This British Naval Pillar, Mausoleum, Observatory, Light-house, or whatever it may be called, as they are all united in the same structure, which, by a very legitimate flight of classical imagination, these Tritons, or sea-gods, have erected to

the

the first Naval Power, will admit of whatever advantages may be obtained from altitude; and, if the settling of snow would permit, it may be raised high enough to see (as Saussure did) the moon and constellations moving in a jet black vault at noon day; whilst the easy unembarrassed road all the way up, might feast the eye, the mind, and the heart, with all desirable national, ethical, or other exemplary useful information. Although this building is at too great a distance in the picture to afford accurate inspection of detailed particulars, yet it is near enough for a general view, as is sufficiently apparent from the group of figures on the basement, looking at one of the basso-relievo's, which, by the fleet of ships and the distant pyramids, might represent the brave Nelson's victory at the Nile; whilst some more youthful characters appear eagerly attentive to what is said with so much energy, as would appear

by

by the action and stretched-out hands of the speaker. At the end of the bridge which connects this building with the chalky shore, is a triumphal arch, through which processions might pass; and, at some distance, under the bridge is seen a more humble, though not less endearing prospect of a village church steeple and fishing-boats, with the men pulling in their nets. A seventy-four gun ship is to windward of the Naval Pillar, stretching out to sea, and a fleet just appearing in the offing.

In the fifth picture, viz. that of the Society, Mr. Barry has also introduced a Tea-kitchen, or Vase for boiling water, which he offers as an improvement on those in general use, which in many respects have been so vulgarly and ill contrived, that, much as he loves tea, yet he can never see these complicated, tasteless urns or vases without disgust, resting, as they generally do, on a sort of pedestals with additional feet to them,

handles

handles unaccounted for, but stuck on merely for the purpose; and the water issuing from an odious, insulated, defenceless, feeble conveyance, stuck in like a spigot in a barrel. In lieu of all this tasteless complicated vulgarity, the vase, in the picture of the Society, is of the simplest and least complicated kind; and if any idea results from its general appearance, it is the sublime suggestion of the Grecian cosmogony, the primæval egg of ancient mother Night, suspended between two mysterious serpents, the principle of regenerating vitality, the convolutions of whose bodies, flung in the air, naturally furnish the handles, and their tails afford the stable circular foot or basis on which the whole rests; whilst the passage for the water of life within, is controuled by the little Psyche or button in the centre, where the heads of those serpents meet at bottom. Perhaps there is nothing in the immense collection of antique vases

in Passeri, or Sir William Hamilton, so classical and completely Grecian as this idea, whilst it is certain that nothing can be more completely adapted to every purpose of security and utility.

There are also some other particulars, of recent introducion, in this picture of the Society, as well as in that of the Elysium; but whatever observations may occur on them will be better reserved for some other time, as this letter is getting too long.

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PREMIUMS

OFFERED BY THE

SOCIETY

INSTITUTED AT LONDON

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES,

AND

COMMERCE,

IN

THE YEAR M.DCCCI.

TO THE PUBLIC.

ADELPHI-BUILDINGS.

THE chief objects of the SOCIETY are to promote the Arts, Manufactures, and Commerce, of this Kingdom, by giving Rewards for all such useful Inventions, Discoveries, or Improvements (though not mentioned in this book), as tend to that purpose; and, in pursuance of this plan, the SOCIETY have already expended full FORTY THOUSAND POUNDS, advanced by the voluntary subscriptions of their Members, Donations, and Legacies bequeathed.

The manner in which this Money has been distributed may be seen by applying to the Secretary or other Officers of the SOCIETY, at their House in the *Adelphi*. The Register of the Premiums and Bounties they have given will show the very great advantages which the Public have derived from this Institution.

The Meetings of the SOCIETY are held every *Wednesday*, at seven o'clock in the evening, from the fourth *Wednesday* in *October* to the first

Wednesday in *June*. The several Committees meet on other evenings in the week during the Session.

In order still farther to promote the laudable views of this SOCIETY, it may be necessary to explain the mode by which its Members continue to be elected.

Each Member has the privilege, at any weekly meeting of the SOCIETY, of proposing any person who is desirous to become a Member, provided such proposal is signed by three Members of the SOCIETY.

Peers of the Realm or Lords of Parliament are, on their being proposed, immediately balloted for; and the name, with the addition and place of abode, of every other person proposing to become a Member, is to be delivered to the Secretary, who is to read the same, and properly insert the name in a list, which is to be hung up in the SOCIETY's Room until the next Meeting; at which time such person shall be balloted for: and, if two-thirds of the Members, then voting, ballot in his favour, he ſhall be deemed a *perpetual Member*, upon payment of *Twenty Guineas* at one payment; or a *ſubſcribing Member*, upon payment of any ſum not leſs than *Two Guineas* annually.

Every

Every Member is entitled to vote and be concerned in all the transactions of the SOCIETY, and to attend and vote at the several Committees. He has also the privilege of recommending two persons as Auditors, at the Weekly Meeting of the SOCIETY; and, by addressing a note to the Register, of introducing his friends to examine the various Models, Machines, and Productions, in different branches of Arts, Manufactures, and Commerce, for which Rewards have been bestowed; and to inspect the magnificent Series of Moral and Historical Paintings, so happily contrived and completed by JAMES BARRY, Esq. which, with ſome valuable Busts and Statues, decorate the Great Room. He has likewiſe the use of a valuable Library, and is entitled to the annual Volume of the SOCIETY's Transactions.

Premiums for Planting and Husbandry.

The Public are requested to take notice, that the Society abide by the Premiums offered in the 18th Volume of their Transactions, for the setting of Acorns, and planting of Timber-trees, although such Premiums are not here re-printed.

Class 1. FOREST-TREES. To the person who shall have inclosed and planted, or set, the greatest number of acres (not less than ten) of land, that is incapable of being ploughed, such as the borders of rivers, the sides of precipices, and any land that has too many rocks, or that is not calculated to repay the expense of tillage, owing to the poverty of the soil, the surface being too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of Forest-trees, namely, Oak, Spanish Chesnuts, Ash, Elm, Beech, Alder, Willow, Larch, Spruce and Silver Fir, with or without screens of Scotch Fir, adapted to the soil, and intended for Timber-trees, between the first of October, 1801, and the first of April, 1802; the GOLD MEDAL.

2. For the second greatest quantity of land, not less than seven acres, the SILVER MEDAL, or TWENTY GUINEAS.

3. For the third greatest quantity of land, not less than five acres, the SILVER MEDAL.

A particular ACCOUNT of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper

proper CERTIFICATES that they were in a healthy and thriving state two years at least after making the plantation, to be delivered to the Society on or before the first Tuesday in November, 1805.

4. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the person who shall ascertain in the best manner, by actual experiments, the comparative merits of the different modes of raising Oaks for Timber, either from Acorns set on land of the foregoing description, properly dug or tilled, from Acorns set by the spade or dibble, without digging or tillage, either on a smooth surface, or among bushes, fern, or other cover; or from young plants previously raised in nurseries, and transplanted; regard being had to the expence, growth, and other respective advantages of the several methods; the GOLD MEDAL.

The ACCOUNTS and proper CERTIFICATES that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the first Tuesday in November, 1801.

5. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in November, 1802.

6. OSIERS. To the person who shall have planted, between the first of October, 1800, and the first of May, 1801, the greatest quantity of land, not less than five acres, with those kinds of Willows, commonly known by the names of Osier, Spaniard, New-kind, or French, fit for the purpose of basket-makers, not fewer than twelve

thousand plants on each acre; the GOLD MEDAL, or THIRTY GUINEAS.

7. For the second greatest quantity of land, not less three acres, the SILVER MEDAL, or TEN GUINEAS.

CERTIFICATES of the planting, and that the plants were in a thriving state five months at least after the planting, to be produced to the Society on or before the last Tuesday in November, 1801.

8. The same premiums are extended one year farther.

CERTIFICATES to be produced on or before the last Tuesday in November, 1802.

*** *The Candidates for planting all kinds of Trees are to certify that the respective Plantations are properly fenced and secured, and particularly to state the condition the Plants were in at the time of signing such Certificate.*

Any information which the Candidates for the foregoing Premiums may choose to communicate, relative to the methods made use of in forming the Plantation, or promoting the growth of the several Trees, or any other observations that may have occurred on the subject, will be thankfully received.

9. SECURING PLANTATIONS OF TIMBER-TREES, AND HEDGE-ROWS. To the person who shall give to the Society the most satisfactory Account, founded on experience, of the most effectual and least expensive method of securing young plantations of Timber-trees, and Hedge-rows, from Hares and Rabbits, as well as Sheep and larger Cattle, which at the same time shall be

be least subject to the depredations of wood-stealers; the SILVER MEDAL, or TWENTY GUINEAS.

The ACCOUNTS, and CERTIFICATES of the efficacy of the method, to be produced to the Society on or before the first Tuesday in November, 1801.

10. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in November, 1802.

11. PREVENTING THE BLIGHT, OR RAVAGES OF INSECTS, ON FRUIT-TREES AND CULINARY PLANTS. To the person who shall discover to the Society the most effectual method of preventing the Blight, or Ravages of Insects, on Fruit-trees and Culinary Plants, superior to any hitherto known or practised, and verified by actual and comparative experiments; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be delivered to the Society on or before the second Tuesday in November, 1801.

12. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in November, 1802.

13. REMOVING THE ILL EFFECTS OF BLIGHTS, OR INSECTS. To the Person who shall discover to the Society the most effectual method of removing the ill effects of Blights, or Insects, on Fruit-trees and Culinary Plants, superior to any hitherto known or practised,

practised, and verified by actual and comparative experiments; he GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1802.

14. COMPARATIVE TILLAGE. For the most satisfactory set of experiments, made on not less than eight acres of land, four of which to be trench-ploughed *, and four to be ploughed in the usual manner, in order to ascertain in what cases it may be advisable to shorten the operations of tillage, by adopting one trench-ploughing, for the purpose of burying the weeds, instead of the method, now in common use, of ploughing and harrowing the land three or four times, and raking the weeds together and burning them; the GOLD MEDAL, or FORTY GUINEAS.

It is required that every operation and expense attending each mode of culture be fully and accurately described, and that proper CERTIFICATES of the nature and condition of the land on which the experiments are made, together with a circumstantial account of the appearance of the subsequent crops during their growth, and also of the quantity and weight of the corn and straw under each mode of culture, or, in case of a green crop, the weight of an average sixteen perches, be produced to the Society on or before the first Tuesday in February, 1803.

15.

* It is a common practice among gardeners, when they have a piece of very foul land, to dig it two spits, or about eighteen inches deep, shovelling the weeds to the bottom. This they call trenching.

15. COMPARATIVE CULTURE OF WHEAT, BROAD-CAST, DRILLED, AND DIBBLED. For the best set of experiments made on not less than twelve acres, four of which to be sown broad-cast, four drilled, and four dibbled, the two latter in equidistant rows, in order fully to ascertain which is the most advantageous mode of cultivating Wheat; the GOLD MEDAL, or FORTY GUINEAS.

It is required that every operation and expense of each mode of culture be fully described; and that proper CERTIFICATES of the nature and condition of the land on which the experiments are made, together with an ACCOUNT of the produce of the Corn, the weight per buſhel, and also of the straw, be produced to the Society, on or before the first Tuesday in February, 1803.

16. SPRING WHEAT. To the person who, in the year 1801, ſhall cultivate the greatest quantity of Spring-Wheat, not less than ten acres, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the time of sowing and reaping be noticed; also a particular ACCOUNT of the species, cultivation, and expense attending it, with proper CERTIFICATES of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year; together with an account of the produce, the weight per Winchester buſhel; and a sample, not less than a quart; be produced to the Society, on or before the second Tuesday in December, 1801,

It is supposed that sowing wheat early in the spring will not only allow more time to till the land, but less for the

the growth of weeds; thus rendering the wheat as clear as a barley crop, and exhausting the soil much less than autumnal sowing. It may be seen in this volume that the wheat usually sown in autumn may be put into the ground, with great success, so late as February or March, thus giving time to clear the ground from turnips, or to avoid a bad season.

17. BEANS AND WHEAT. To the person who shall have dibbled or drilled, between the first of December, 1801, and the first of April, 1802, the greatest quantity of land, not less than ten acres, with Beans, in equidistant rows, and hoed the intervals twice or oftener, and shall have sown the same land with wheat in the autumn of the year 1802; the SILVER MEDAL, or TWENTY GUINEAS.

It is required that an account of the sort and quantity of Beans, the time of dibbling or drilling, and of reaping or mowing them, the produce per acre threshed, the application of the straw, the expense of dibbling or drilling, hand or horse hoeing, the distance of the rows, and the quality of the soil, together with CERTIFICATES of the number of acres, and that the land was afterwards actually sown with wheat, be produced on or before the second Tuesday in March, 1803.

18. BEANS. To the person who, in the year 1801, shall discover and cultivate, either by the drill or dibbling-method, on not less than five acres, a species of Horse Beans or Tick Beans, that will ripen their seeds before the first of August; the SILVER MEDAL, or TWENTY GUINEAS.

It is required that a particular account of the Bean, the cultivation, and the expence attending it, with proper CERTIFICATES of the nature and condition of the land on which the experiments are made, together with an account of the produce, the weight per Winchester bushel, and a sample of not less than a quart, be produced to the Society, on or before the first Tuesday in December, 1801.

It is apprehended that if a Bean should be brought into cultivation with the habits of the Hotspur or other early Peas, that it would, in a great measure, escape the danger arising from the Collier insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of Wheat.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in December, 1801.

19. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in December, 1802.

20. COMPARATIVE CULTURE OF TURNIPS. For the best set of experiments made on not less than eight acres of land, four of which to be sown broad-cast, and four drilled, to ascertain whether it is most advantageous to cultivate Turnips by sowing them broad-cast and twice hand-hoeing them, or by drilling them in equidistant rows and horse-hoeing the intervals; the SILVER MEDAL, or TWENTY GUINEAS.

It is required that every operation and expense of each mode of culture be fully described, and that proper CERTIFICATES of the nature and condition of the land on which the experiments were made, together with the weight

weight of the turnips grown, on a fair average sixteen perches of land, under each mode of culture, be produced to the Society on or before the first Tuesday in March, 1802.

21. PARSNIPS. To the person who, in the year 1801, shall cultivate the greatest quantity of land, not less than five acres, with Parsnips, for the sole purpose of feeding Cattle or Sheep; the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES of the quantity of land so cultivated, with a particular account of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the Cattle or Sheep fed with the Parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1802.

22. ROTATION OF CROPS. To the person who shall, between the tenth of August, 1801, and the tenth of September, 1803, cultivate the greatest quantity of land, not less than sixty acres, in the following rotation, *viz.* first, Winter-Tares; second, Turnips; and third, Wheat; and apply the two former crops in the best and most farmer-like manner, to the rearing, supporting, and fattening, Cattle and Sheep, on the land which produced the crops; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

23. For the next in quantity and merit, on not less than forty acres; the SILVER MEDAL, or FIFTY GUINEAS.

24.

24. For the next in quantity and merit, on not less than twenty acres, the SILVER MEDAL.

It is required that every operation and expense be fully described, and that satisfactory CERTIFICATES of the nature and condition of the soil on which the crops have grown, together with an account of their appearance, the number and kinds of Cattle fed by the two green crops, and, as near as possible, the improved value of the live stock by the consumption of those crops, and also the quantity and weight of the wheat and straw, be produced to the Society on or before the first day of March, 1804.

It is presumed that very great advantages will arise to such agriculturists as shall adopt this rotation of crops on a dry soil: they will be enabled, with the addition of a few acres of turnip-rooted Cabbage for spring-food, to keep such large flocks of Sheep, and herds of neat Cattle, as may secure a sufficient quantity of manure to fertilize their land in the highest degree, and in every situation.

It is farther conceived that Wheats which will bear sowing in the spring will be particularly suitable for this premium.

25. The same premium is extended one year farther.

CERTIFICATES to be delivered on or before the first day of March, 1805.

26. PRESERVING TURNIPS. To the person who shall discover to the Society the best and cheapest method of preserving Turnips perfectly sound, and in every respect fit for the purpose of supporting and fattening Sheep and neat Cattle, during the months of February, March, and April; the GOLD MEDAL, or THIRTY GUINEAS.

It

It is required that a full and accurate account of the method employed, and the expense attending the process; together with CERTIFICATES that the produce of four acres at the least has been preserved according to the method described, and applied to the feeding of Sheep and neat Cattle; that the whole were drawn out of the ground before the first day of February, in order to clear the greater part of it previous to its being prepared for Corn, and to save the soil from being exhausted by the Turnips; and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the first Tuesday in November, 1802.

N. B. *It is recommended to those who may be induced to try the necessary experiments for obtaining this and the following four premiums, to consider the method employed for the preservation of potatoes in ridges (which the growers call pies), and also the propriety of adopting a similar method in cases where they are previously frozen. It is supposed that, in the latter instance, the addition of ice or snow, and the construction of the ridges upon a large scale, may be sufficient to preserve the freezing temperature till the vegetables are wanted for the use of Cattle or Sheep, at which time they may be thawed by immersion in cold water, and the* rot *which a sudden thaw produces may be prevented.*

27. For the next in quantity and merit, on not less than two acres, the SILVER MEDAL, or FIFTEEN GUINEAS.

28. PRESERVING CABBAGES. To the person who shall discover to the Society the best and cheapest method of preserving drum-headed Cabbages perfectly sound, and in every respect fit for the purpose of support-

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ing and fattening Sheep and neat Cattle during the months of February, March, and April; the GOLD MEDAL, or THIRTY GUINEAS.

29. For the next in quantity and merit, on not less than two acres, the SILVER MEDAL, or FIFTEEN GUINEAS.

Conditions the same as for preserving Turnips, *Cl.* 26.

The ACCOUNTS to be produced on or before the first Tuesday in November, 1802.

30. PRESERVING CARROTS, PARSNIPS, OR BEETS. To the person who shall discover to the Society the best and cheapest method of preserving Carrots, Parsnips, or Beets, perfectly sound, and in every respect fit for the purpose of supporting and fattening Sheep and neat Cattle during the months of February, March, and April; the SILVER MEDAL, or FIFTEEN GUINEAS.

Conditions the same as for preserving Turnips, *Cl.* 26.

The ACCOUNTS to be delivered in, on or before the first Tuesday in November, 1802.

31. PRESERVING POTATOES. To the person who shall discover to the Society the best and cheapest method of preserving Potatoes, two or more years, perfectly sound, without vegetating, and in every other respect fit for the purpose of sets and the use of the table, and, consequently, of supporting and fattening Cattle; the SILVER MEDAL, or TWENTY GUINEAS.

It is required, that a full and accurate ACCOUNT of the method employed, and the expense attending the process,

with CERTIFICATES that one hundred bushels, at the least, have been preserved according to the method described, and that one or more bushels of the same Potatoes have been set, and produced a crop without any apparent diminution of their vegetative power; and also that they have been used at table with entire satisfaction to the persons who eat of them, together with a sample of one bushel; be sent to the Society on or before the first Tuesday in November, 1804.

32. MAKING MEADOW HAY IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making Meadow Hay in Wet Weather; the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed, and of the expense attending the process, with not less than fifty-six pounds of the Hay; and Certificates that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the samples; to be produced on or before the first Tuesday in January, 1802.

33. HARVESTING CORN IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting Corn in Wet Weather; the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed, and of the expense attending the process, with not less than two sheaves of the Corn, and Certificates that at least the produce of ten acres has been harvested according to the

method

method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1802.

34. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the person who shall produce to the Society the most satisfactory set of experiments, to ascertain the due proportion of the several component parts of Arable Land, in one or more Counties in Great Britain, by an accurate analysis of it; and who, having made a like analysis of some poor land, shall, by comparing the component parts of each, and thereby ascertaining the deficiencies of the poor soil, improve a quantity of it, not less than one acre, by the addition of such parts as the former experiments shall have discovered to be wanting therein, and therefore probably the cause of its sterility; the GOLD MEDAL, or FORTY GUINEAS.

It is required that the manurings, ploughings, and crops of the improved land, be the same after the improvement as before; and that a minute account of the produce in each state, of the weather, and of the various influencing circumstances, together with the method made use of in analysing the soils, be produced, with proper CERTIFICATES, and the chemical results of the analysis, which are to remain the property of the Society, on or before the last Tuesday in November, 1802.

It is expected that a quantity, not less than six pounds, of the rich, of the poor, and of the improved soils, be produced with the Certificates.

35. IMPROVING LAND LYING WASTE. For the most satisfactory account of the best method of improving

proving any of the following soils, being land lying waste or uncultivated, viz. Clay, Gravel, Sand, Chalk, Peat-earth, and Bog, verified by experiments on not less than fifty acres of land; the GOLD MEDAL, or THIRTY GUINEAS.

36. For the next greatest quantity, not less than thirty acres, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the land before such improvement be absolutely uncultivated, and in a great measure useless; and that, in its improved state, it be enclosed, cultivated, and divided into closes.

CERTIFICATES of the number of acres, of the quality of the land so improved, with a full account of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1803.

37. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following Manures, used as Top-dressings, on Grass or Corn Land, viz. Soot, Coal-ashes, Wood-ashes, Lime, Gypsum, Night-soil, or any other fit article; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that the above experiments be made between two or more of the above-mentioned Manures, and that not less than two acres of land be dressed with each Manure. An account of the nature of the soil, quantity and expense of the Manure and Crops, with CERTIFICATES, to be produced on or before the last Tuesday in February, 1802.

38. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be produced on or before the last Tuesday in February, 1803.

39. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account of the best method, verified by actual experiment, of gaining Land from the Sea, not less than twenty acres, on the coast of Great Britain; the GOLD MEDAL.

CERTIFICATES of the quantity of Land, and that the experiments were begun after the first of January, 1796, to be produced to the Society on or before the first Tuesday in October, 1801.

40. The same premium is extended one year farther.

CERTIFICATES to be produced on or before the first Tuesday in October, 1802.

41. The same premium is extended one year farther.

CERTIFICATES to be produced on or before the first Tuesday in October, 1803.

42. MACHINE FOR DIBBLING WHEAT. To the person who shall invent the best Machine, to answer the purpose of Dibbling Wheat, by which the holes for receiving the Grain may be made at equal distances and proper depths, the grain regularly delivered therein, and effectually covered; the SILVER MEDAL, or TWENTY GUINEAS.

The MACHINE, with CERTIFICATES that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1802.

Simplicity and cheapness in the construction will be considered as principal parts of its merit.

43. MACHINE FOR REAPING OR MOWING CORN. For inventing a Machine to answer the purpose of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the GOLD MEDAL, or THIRTY GUINEAS.

The MACHINE, with CERTIFICATES that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1801. Simplicity and cheapness in the construction will be considered as principal parts of its merit.

44. THRESHING MACHINE. To the person who who shall invent a Machine by which Corn of all sorts may be threshed more expeditiously, effectually, and at a less expense, than by any method now in use; the GOLD MEDAL, or THIRTY GUINEAS.

The MACHINE or a Model, with proper CERTIFICATES that such a machine has been usefully applied, that at least thirty quarters have been threshed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1802.

45. DESTROYING THE GRUB OF THE COCK-CHAFER. To the person who shall discover to the Society

Society an effectual method, verified by repeated and satisfactory trials, of destroying the Grub of the Cock-chafer, or of preventing or checking the destructive effects which always attend Corn, Peas, Beans, and Turnips, when attacked by those insects; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced on or before the first Tuesday in January, 1802.

46. DESTROYING WORMS. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying Worms, or of preventing the destructive effects they occasion on Corn, Beans, Peas, or other Pulse; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced to the Society on or before the first Tuesday in January, 1802.

47. DESTROYING THE FLY ON HOPS. To the person who shall discover to the Society an easy and efficacious method of destroying the Fly on Hops, superior to any hitherto known or practised, on not less than six acres of Hop-ground; the GOLD MEDAL, or THIRTY GUINEAS.

ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1802.

48. CURE OF THE ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of curing the Rot in Sheep, verified by

repeated and satisfactory experiments; the GOLD MEDAL, or FIFTY GUINEAS.

It is expected that the Candidates furnish accurate accounts of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper CERTIFICATES, must be delivered to the Society on or before the first Tuesday in February, 1802.

49. PREVENTING THE ILL EFFECTS OF FLIES ON SHEEP. To the person who shall discover to the Society the most effectual method of protecting Sheep from being disturbed and injured by Flies; the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the method be ascertained by repeated experiments, and that a CERTIFICATE of its efficacy be delivered to the Society on or before the first Tuesday in December, 1801.

50. PROTECTING SHEEP. To the person who, in the year 1801, shall protect the greatest number of Sheep, not fewer than one hundred, by hovels, sheds, or any other means, and give the most satisfactory account, verified by experiment, of the advantages arising from the practice of protecting Sheep from the inclemency of the weather, by hovels, sheds, or any other means; the SILVER MEDAL, or TWENTY GUINEAS.

A particular account of the experiments made, with the advantages arising therefrom, together with the expense, and CERTIFICATES of its utility, to be produced to the Society on or before the first Tuesday in March, 1802.

51. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in March, 1803.

N. B. It is required that the CERTIFICATES shall specify the length of time the Sheep were so protected, and the manner in which they were maintained during that time; together with the general method of managing them.

52. IMPROVING THE CONDITION OF THE LABOURING POOR, BY ERECTING COTTAGES, AND APPORTIONING LAND. To the person who, in the year 1801, shall erect the greatest number of Cottages for the accommodation of the Labouring Poor, and apportion not less than two acres of Land to each Cottage; the GOLD MEDAL.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1802.

53. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1803.

54. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1804.

55. IMPROVING THE CONDITION OF THE LABOURING POOR, BY APPORTIONING LAND TO

TO COTTAGES. To the person who, in the year 1801, shall apportion to the greatest number of Cottages, already built upon his or her estate, any quantity of Land, not less than two acres to each Cottage, for the better accommodation of the respective Inhabitants; the GOLD MEDAL.

The ACCOUNTS of the number of Cottages, and of the quantity of Land apportioned to each, to be delivered to the Society, with proper CERTIFICATES, on or before the first Tuesday in February, 1802.

56. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1803.

57. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1804.

Premiums for Discoveries and Improvements in Chemistry, Dying, and Mineralogy.

58. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the Seeds of Plants in a state fit for Vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial; to be communicated to the Society on or before the first Tuesday in December, 1801; the GOLD MEDAL, or THIRTY GUINEAS.

59. PREVENTING THE DRY-ROT IN TIMBER. To the person who shall discover to the Society the cause of the Dry-rot in Timber, and disclose a certain method of prevention, superior to any hitherto known; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in December, 1801.

60. PRESERVING FRESH WATER SWEET. To the person who shall produce to the Society the best Account, verified by satisfactory trials, of an efficacious method of preserving Fresh Water sweet, during long voyages; the GOLD MEDAL, or FIFTY GUINEAS.

ACCOUNTS, and full descriptions of the methods made use of, in order that it may be known that nothing injurious enters therein, to be produced to the Society, with at least thirty

thirty gallons of water so preserved, and proper CERTIFICATES, on or before the last Tuesday in December, 1801.

61. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving Salted Provisions from growing Rancid or Rusty; the GOLD MEDAL, or THIRTY GUINEAS.

A full description of the method, with proper CERTIFICATES that it has been found, on repeated trials, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1802.

62. CLEARING FEATHERS FROM THEIR ANIMAL OIL. To the person who shall discover to the Society the best and most expeditious method, superior to any hitherto practised, of clearing Goose-feathers from their offensive animal Oil, for the use of upholders, in making beds, cushions, &c. the SILVER MEDAL, or TWENTY GUINEAS.

A quantity of such Feathers unstripped and so cleaned, not less than forty pounds weight, with a full account of the process, to be produced to the Society on or before the first Tuesday in February, 1802.

63. REFINING WHALE OR SEAL OIL. For disclosing to the Society an effectual method of purifying Whale or Seal Oil from the glutinous matter that incrusts the wicks of lamps and extinguishes the light, though fully supplied with Oil; the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society, to determine the validity of the claim; and CERTIFICATES that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the Oil in its unpurified state, and two gallons so refined, be produced to the Society on or before the second Tuesday in February, 1802.

64. MANUFACTURING TALLOW CANDLES. To the person who shall discover to the Society a method of hardening or otherwise preparing Tallow, so that Candles may be made of it, which will burn as clear and with as small a wick as wax candles without running, and may be afforded at a less expense than any at present made with spermaceti; the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES that one hundred and twelve pounds of such Tallow have been made into Candles, and twelve pounds of the Candles made thereof, to be produced to the Society on or before the second Tuesday in January, 1802.

65. CANDLES FROM RESIN OR OTHER SUBSTANCES. To the person who shall discover to the Society the best method of making Candles of Resin, or any other substance, fit for common use, at a price much inferior to those made of Tallow only; the GOLD MEDAL, or THIRTY GUINEAS.

Six pounds at least of the Candles so prepared, with an ACCOUNT of the process, to be delivered to the Society on or before the first Tuesday in December, 1801.

66.

66. METHOD OF SEPARATING SUGAR IN A SOLID FORM FROM TREACLE. To the person who shall discover to the Society the best method of separating Sugar from Treacle in a solid form, at such an expense as will render it advantageous to the public; the GOLD MEDAL, or FIFTY GUINEAS.

A quantity of the Sugar so prepared in a solid form, not less than thirty pounds weight, with an account of the process, and CERTIFICATES that not less than one hundred weight has been prepared, to be produced to the Society on or before the first Tuesday in February, 1802.

67. PROOF SPIRIT. To the distiller who, in the year 1801, shall make the greatest quantity, not less than one hundred gallons, of a clean marketable Spirit, from articles not the food of man or cattle, equal in strength or quality to the Proof Spirit now in use, and at a rate not higher than the spirit produced from Corn or Melasses; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

Ten gallons of the Spirit, together with proper CERTIFICATES, and a full account of the expense and mode of making it, to be produced to the Society on or before the first Tuesday in January, 1802.

68. INCREASING STEAM. To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or force of Steam, in Steam-engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using Steam-engines may be considerably lessened; the GOLD MEDAL, or THIRTY GUINEAS.

To

To be communicated to the Society on or before the first Tuesday in January, 1802.

69. DESTROYING SMOKE. For the best account, ascertained by proper experiments, of a cheap method of burning the Smoke of Fires belonging to Steam-engines, Furnaces employed in calcining or smelting metals, or other large works, in order to prevent annoyance to the neighbourhood; the GOLD MEDAL, or THIRTY GUINEAS.

To be produced on or before the first Tuesday in January, 1802.

70. CONDENSING SMOKE. To the person who shall invent the best method by which the Smoke of Steam-engines, Brewhouses, Sugar-houses, or Furnaces, may be advantageously condensed and collected in the form of tar, or some other useful material; the GOLD MEDAL, or FIFTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES of the method having been successfully employed, and specimens of the materials produced, to be delivered to the Society on or before the first Tuesday in January, 1802.

71. SUBSTITUTE FOR TAR. To the person who shall invent and discover to the Society the best substitute for Vegetable Tar, equal in all its properties to the best Stockholm Tar, and prepared from materials the produce of Great Britain; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Substitute, not less than one hundred weight, with CERTIFICATES that at least one ton has been manu-

manufactured, and that it can be afforded at a price not exceeding that of the best foreign Tar, together with an account of the process, to be delivered to the Society on or before the first Tuesday in March, 1802.

72. PREPARATION OF TAN. To the person who shall prepare in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, the largest quantity, not less than one hundred weight, of the principle called by the French *Tannin*, which abounds in Oak-bark and many other vegetable substances; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES of the above quantity having been prepared, and a sample of not less than twenty-eight pounds, to be produced to the Society on or before the last Tuesday in January, 1802.

73. PREPARATION OF A RED STAIN FOR COTTON CLOTH. To the person who shall communicate to the Society the cheapest and most effectual method of Printing or Staining Cotton Cloths with a Red Colour, by an immediate application of the colouring-matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder; the Gold MEDAL, or THIRTY GUINEAS.

CERTIFICATES that the above process has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length, one piece of the calico so printed, a quart of the colour in a liquid state, and a full account of the preparation and application, to be produced to the Society on or before the second Tuesday in January, 1802.

74. PREPARATION OF A GREEN COLOUR FOR PRINTING COTTON CLOTH. To the person who shall communicate to the Society the best and cheapest method of Printing with a full Green Colour on Cotton Cloth, by an immediate application of the colouring-matter from a wooden block to the Cloth, equally beautiful and durable as the colours now formed from the complicated process of the decoction of weld on alumine and the solutions of indigo by earths or alcaline salts; the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES and conditions as for premium 73.

75. SUBSTITUTE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best Substitute, superior to any hitherto known, for the Basis of Paint, equally proper for the purpose as the White Lead now employed; such Substitute not to be of a noxious quality, and to be afforded at a price not materially higher than that of White Lead; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Substitute, not less than fifty pounds weight, with an ACCOUNT of the process used in preparing it, and CERTIFICATES that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in January, 1802.

76. RED PIGMENT. To the person who shall discover to the Society a full and satisfactory process for preparing a Red Pigment, fit for use, in oil or water, equal in tone or brilliancy to the best Carmines and Lakes

now known or in use, and perfectly durable; the GOLD MEDAL, or THIRTY GUINEAS.

One pound weight of such Colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1802.

N. B. It is not required that the Colour should resist the action of fire or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noisome vapours.

77. ULTRAMARINE. To the person who shall prepare an artificial Ultramarine, equal in colour, brilliancy, and durability, to the best prepared from Lapis Lazuli, and which may be afforded at a cheap rate; the GOLD MEDAL, or THIRTY GUINEAS.

The conditions are the same as in the preceding premium for the Red Pigment.

78. ANALYSIS OF BRITISH MINERALS. To the person who shall communicate to the Society the most correct Analysis of any Mineral production of Great Britain, hitherto either unexamined, or not examined with accuracy; the GOLD MEDAL.

The Analysis and sufficient specimens to be produced to the Society on or before the first Tuesday in January, 1802.

79. PREPARATION OF SULPHURIC ACID FROM SULPHUR, WITHOUT THE USE OF ANY NITRIC SALT. To the person who shall prepare the largest

largest quantity (not less than one ton) of Sulphuric Acid from Sulphur, without any Nitric Salt, of a specific gravity, not inferior to the best Sulphuric Acid of commerce; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES that not less than the above quantity of such an Acid has been prepared, together with a sample, to be produced to the Society on or before the first Tuesday in January, 1802.

80. PREPARATION OF ANY ALKALINE OR EARTHY NITRATE. To the person who shall prepare, in Great Britain, the largest quantity, not less than one hundred weight, of any salt of Nitric Acid, with either earths or alkalies, by a method superior to those hitherto practised; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

CERTIFICATES of the above quantity having been prepared, and a sample of not less than twenty-eight pounds, to be produced to the Society on or before the last Tuesday in January, 1802.

81. FINE BAR-IRON. To the person, in Great Britain, who shall make the greatest quantity of Bar-Iron, not less than ten tons, with Coak, from Coak-Pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for converting into steel; the GOLD MEDAL, or FIFTY GUINEAS.

Samples, not less than one hundred weight, with CERTIFICATES that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1802.

82. PRESERVING IRON FROM RUST. To the person who shall invent and discover to the Society a cheap composition, superior to any now in use, which shall effectually preserve Wrought Iron from Rust; the GOLD MEDAL, or FIFTY GUINEAS.

A full description of the method of preparing the composition, with CERTIFICATES that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1802.

83. The same premium is extended one year farther.

The description and CERTIFICATES to be produced to the Society on or before the last Tuesday in January, 1803.

84. REFINING BLOCK TIN. To the person who shall discover to the Society the best method of purifying or refining Block Tin, so as to render it fit for the finest purposes to which Grain Tin is now applied, and not higher in price; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES that not less than three tons have been refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the Tin so refined, to be produced to the Society on or before the first Tuesday in January, 1802.

85. GLAZING EARTHEN WARE WITHOUT LEAD. To the person who shall discover to the Society the cheapest, safest, most durable, and most easily fusi-

ble,

ble composition, fit for the purpose of Glazing the ordinary kinds of Earthen Ware, without any preparation of Lead, and superior to any hitherto in use; the GOLD MEDAL, or THIRTY GUINEAS.

Specimens of the Ware so glazed, with proper CERTIFICATES of its having succeeded, and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1802.

Premiums for promoting the Polite Arts.

86. HONORARY PREMIUMS FOR DRAWING, BY NOBILITY. For the best Drawing, of any kind, made with water-colours, crayons, chalk, black lead, pen, Indian ink, or bister, by young Gentlemen under the age of twenty-one, sons or grandsons of Peers, or Peeresses in their own right, of Great Britain or Ireland, to be produced on or before the first Tuesday in March, 1802; the HONORARY MEDAL OF THE SOCIETY IN GOLD.

87. The same in Silver for the next in merit.

88. The same premiums will be given, on the like conditions, to young Ladies, daughters or grand-daughters of Peers, or Peeresses in their own right, of Great-Britain or Ireland.

89. HONORARY PREMIUMS FOR DRAWING, BY GENTLEMEN. Por the best Drawing, of any kind, made with water-colours, crayons, chalk, black lead, pen, Indian ink, or bister, by young Gentlemen under the age of twenty-one; to be produced on or before the first Tuesday in March, 1802; the GOLD MEDAL.

90. For the next in merit, the SILVER MEDAL.

91.

91. The same premiums will be given for Drawings by young Ladies.

N. B. As the foregoing Honorary Premiums are intended only for such of the Nobility and Gentry as may hereafter become patrons or patronesses of the Arts, persons professing any branch of the Polite Arts, or any business dependent on the Arts of Design, or the sons or daughters of such persons, will not be admitted Candidates in these Classes.

92. DRAWINGS OF OUTLINES. For the best Outline, after an original group or cast, in Plaster, of Human Figures, by persons of either sex, under the age of sixteen, the principal figure not less than twelve inches; to be produced on or before the third Tuesday in February, 1802; the greater SILVER PALLET.

93. For the next in merit, the lesser SILVER PALLET.

N. B. These Drawings are to be made on paper, and the original either to be produced to the Society, or to be referred to for their examination.

94. DRAWINGS OF LANDSCAPES. For the best Drawing of a Landscape after nature, by persons of either sex, under twenty-one years of age, to be produced on or before the third Tuesday in February, 1802; the greater SILVER PALLET.

95. For the next in merit, the lesser SILVER PALLET.

Each candidate must mention, on the front of the Drawing, whence the View was taken; and the Drawings

must be made with Chalk, Pen, Indian Ink, Water-Colours, or Bister.

96. HISTORICAL DRAWINGS. For the best Historical Drawing, being an original composition, of five or more Human Figures; the height of the principal figure not less than eight inches; to be made with crayons, chalk, black lead, pen, Indian ink, water-colours, or Bister, and to be produced on or before the third Tuesday in February, 1802; the GOLD PALLET.

97. For the next in merit, the greater SILVER PALLET.

98. STROKE ENGRAVINGS OF HISTORICAL SUBJECTS. For the best Stroke Engraving, published in the year 1801, of an historical subject, the size of the plate not less than eighteen inches by fourteen; the GOLD MEDAL.

To be produced to the Society on or before the last Tuesday in January, 1802; and the impression to which the premium is adjudged to remain the property of the Society.

99. For the next in merit, the SILVER MEDAL, on similar conditions.

100. CHINTS PATTERNS FOR CALICO-PRINTERS. For the best Original Pattern in a new taste, of light or dark ground Chints for garment-work, fit for the purposes of Calico-Printers, by persons of either sex; the GOLD MEDAL.

To be produced to the Society on or before the second Tuesday in January, 1802; the Pattern to which the premium is adjudged to remain the property of the Society.

101. For the next in merit, the SILVER MEDAL, on similar conditions.

102, COPPER-PLATE PATTERNS FOR CALICO PRINTERS. For the best Pattern, in a new style, fit for the purposes of Calico-Printers for garment-work, the SILVER MEDAL.

To be produced to the Society on or before the second Tuesday in January, 1802.

The Pattern to which the premium is adjudged to remain the property of the Society.

103. ENGRAVING ON WOOD. For the best Engraving on Wood, for illustrating works in arts or sciences, or for decorating books, and capable of being worked with the letter-press; the SILVER MEDAL.

The Engraving, and two or more impressions from it, to be produced to the Society on or before the second Tuesday in January, 1802; and the impressions from that engraving to which the premium is adjudged to remain the property of the Society.

The following Premium (Class 104) is offered in conformity to the Will of the late John Stock, of Hampstead, Esq.

104. SCULPTURE. For the best Basso-relievo in Terra Cotta, the subject taken from the Iliad of Homer, and

and consisting of not fewer than three human figures, the height of the principal figure not less than twelve inches, to be produced on or before the third Tuesday in February, 1802; a SILVER MEDALLION, with the following engraved inscription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

The Basso-relievo to which the premium is adjudged, to remain the property of the Society.

105. BRONZES. For the best Drapery Figure or Group cast in Bronze; if a single Figure, not less than twelve inches high; and, if a Group, not less than nine inches; and which will require the least additional labour to repair; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

The Cast to be exhibited to the Society before it is begun to be repaired, with the original Figure or Group, on or before the first Tuesday in February, 1802, together with a full explanation of the whole process.

106. SURVEYS OF COUNTIES. To the person who, in the year 1801, shall complete and publish an accurate Survey of any one County in England or Wales, on a scale of not less than one inch to a mile, for which rewards have not already been given by the Society; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES of the accuracy of the Survey, and that it was begun after the first of June, 1797, together with the Map, to be produced on or before the first Tuesday in January, 1802.

The

The Map to which the premium shall be adjudged, to remain the property of the Society.

N. B. The Society is already in possession of Surveys of the following Counties, viz. Bedford, Cheshire, Cornwall, Cumberland, Derbyshire, Devonshire, Dorsetshire, Durham, Hampshire, Herefordshire, Hertfordshire, Huntingdonshire, Lancashire, Leicestershire, Northamptonshire, North Wales (large and small), Nottinghamshire, Oxfordshire, Somersetshire, Staffordshire, Suffolk, Surrey, Sussex, Westmoreland, and Worcestershire.

107. NATURAL HISTORY. To the Author who shall publish, in the year 1801, the Natural History of any County in England or Wales; the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the several natural productions, whether animal, vegetable, or mineral, peculiar to the County, or found therein, be carefully and specifically arranged aud described, in order that the public may be enabled to judge what Arts or Manufactures are most likely to succeed in such County.

The Work to be delivered to the Society on or before the last Tuesday in January, 1802.

CONDITIONS FOR THE POLITE ARTS.

No person who has gained the first premium in any Class, will be admitted a Candidate in a Class of an inferior age; and no Candidate shall receive more than one Premium in one year; nor will they, who for two successive years shall gain the first Premium in one Class, be ever again admitted as Candidates in that Class.

No

No person shall ever be admitted a Candidate in any Class, in which he has three times obtained the whole of the first Premium.

No Candidate shall send in more than one Performance in any one Class.

All the Claims which are produced each Session before the Committee of Polite Arts (to which Premiums or Bounties are adjudged) are to remain with the Society till after the public distribution of Rewards in May; and after that re-delivered, unless where mentioned in the Premiums to the contrary.

No Claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain, a Premium, Reward, or Gratification, from any other Society, or any Academy or School.

All performances that obtain Premiums in the Polite Arts, must be begun after the publication of such Premiums.

Purposely to encourage real merit, and to prevent any attempts to impose on the Society, by producing drawings which shall have been made or retouched by any other person than the Candidate, the Society is resolved, upon all occasions, with respect to the successful candidates in classes 86 to 97 inclusive, to prove their abilities, by requiring a specimen, made under the inspection of the Committee of Polite Arts, in every instance where such proof can be obtained.

It is required that all Candidates in the Polite Arts do signify, on their Drawings, their age; and whether the performances are originals or copies; and, if copies, whence they were taken.

Premiums for encouraging and improving Manufactures.

108. MACHINE FOR CARDING SILK. For the best Machine, superior to any now in use, for carding Waste Silk equally well as by hand; to be produced, together with a specimen of the Cardings, on or before the first Tuesday in November, 1801; the SILVER MEDAL, or TWENTY GUINEAS.

109. CLOTH HOP-STALKS OR BINES. To the person who shall produce to the Society the greatest quantity, not less than thirty yards, of Cloth, at least twenty-seven inches wide, made in Great Britain, of Hop-Stalks or Bines, and much finer in quality than any hitherto manufactured in England of that material; the GOLD MEDAL, or THIRTY GUINEAS.

One pound of the Thread of which the Cloth is made, and thirty yards of the Cloth, together with proper CERTIFICATES that the whole is manufactured from Hop-Stalks or Bines, to be produced to the Society on or before the first Tuesday in December, 1801.

N. B. The Society is already in possession of Cloth made in England from Hop-Stalks or Bines, which may be inspected by application to the Register.

110. WICKS FOR CANDLES OR LAMPS. To the person who shall discover to the Society a method of manufacturing Hop-Stalks or Bines, or any other cheap material, the growth of Great Britain, so as to render them

them fit for the purpose of supplying the place of Cotton, for Wicks of Candles or Lamps; TWENTY GUINEAS.

SAMPLES, not less than five pounds weight, of the Wicks, so prepared, to be produced to the Society, with CERTIFICATES that the whole quantity is equal in quality to the Sample, on or before the second Tuesday in January, 1802.

111. PAPER FROM RAW VEGETABLE SUBSTANCES. To the person, in Great Britain, who shall, between the first of January, 1801, and the first of January, 1802, make the greatest quantity, and of the best quality, not less than ten reams, of good and useful Paper, from Raw Vegetable Substances, the produce of Great Britain or Ireland, of which one hundred weight has not been used in manufacturing Paper previous to January, 1801, superior to any hitherto manufactured from such Substances, and which can be generally afforded as cheap as paper of equal quality and apppearance now made from rags; TWENTY GUINEAS.

N. B. The object of the Society being to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of Paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of Paper made from Raw Vegetable Substances, viz. Nettles, Potatoe-Hawlm, Poplar, Hop-Bines, &c. which volumes may be inspected by any person on application to the Register.

CERTIFICATES of the making such Paper, and one ream of the Paper, to be produced on or before the second Tuesday in January, 1802.

112. TAKING PORPOISES. To the people in any boat or vessel, who, in the year 1801, shall take the greatest number of Porpoises, on the coast of Great Britain, by Gun-Harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; the GOLD MEDAL, or THIRTY POUNDS.

CERTIFICATES of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society, on or before the last Tuesday in January, 1802.

113. OIL FROM PORPOISES. To the person who shall manufacture the greatest quantity of Oil from Porpoises taken on the coast of Great Britain, in the year 1800, not less thirty tons; the GOLD MEDAL, or THIRTY POUNDS.

Premiums for Inventions in Mechanics.

114. TRANSIT-INSTRUMENT. To the person who shall invent and produce to the Society a cheap and portable Transit-instrument, which may easily be converted into a Zenith-sector, capable of being accurately and expeditiously adjusted for the purpose of finding the latitudes and longitudes of places, and superior to any portable Transit-instrument now in use; the GOLD MEDAL, or FORTY GUINEAS.

To be produced on or before the last Tuesday in January, 1802.

115. TAKING WHALES BY THE GUN-HARPOON. To the person who, in the year 1801, shall strike the greatest number of Whales, not fewer than three, with the Gun-harpoon; TEN GUINEAS.

Proper CERTIFICATES of the striking such Whales, and that they were actually taken in the year 1800, signed by the Master, or by the Mate when the Claim is made by the Master, to be produced to the Society on or before the last Tuesday in December, 1801.

116. DRIVING BOLTS INTO SHIPS. To the person who shall invent and produce to the Society a Model, shewing a method of driving Bolts into Ships, particularly those of Copper, without splitting the head or bending them, with more dispatch, in all directions, and tighter, than by any means hitherto known or in use; the GOLD MEDAL, or FORTY GUINEAS.

The

The Model, with CERTIFICATES that a Machine on the same construction has been used to advantage, to be produced to the Society on before the first Tuesday in February, 1802.

117. PARISH OR FAMILY-MILL. To the person who shall invent and produce to the Society the best constructed Mill for grinding Corn for the use of private Families, or Parish-poor; the conſtruction to be such as to render the working of the Mill eaſy and expeditious, and ſuperior to any hitherto in use; the GOLD MEDAL, or FORTY GUINEAS.

The Mill, and CERTIFICATES of its having been used to good effect, to be produced to the Society on or before the first Tuesday in February, 1802.

N. B. Cheapness and simplicity will be considered as essential parts of its merit; and the Mill, or the Model, to remain with the Society.

118. MACHINE FOR RAISING COALS, ORE, &c. &c. To the person who shall invent a Machine for raising Coals, Ore, &c. from Mines, superior to any hitherto known or in use, and which shall produce the effect at a less expense than those already known or in use; the GOLD MEDAL, or FIFTY GUINEAS.

A Model of the Machine, made on a scale of not less than one inch to a foot, with a CERTIFICATE that a Machine at large on the same construction has been advantageously used, to be produced to the Society on or before the second Tuesday in February, 1802.

119. MACHINE FOR RAISING WATER. To the person who shall invent a Machine on a better, cheaper, and more simple construction than any hitherto known or

in use, for raising Water out of Wells, &c. from a depth of not less than fifty feet; the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the performance of the Machine, and a Model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1802.

120. MACHINE FOR MAKING BRICKS. To the person who shall invent the best and cheapest Machine for making Bricks, superior to any hitherto known or in use, whereby the labour and expense of making Bricks in the usual mode, by hand, may be greatly diminished; FORTY GUINEAS.

A Model, with CERTIFICATES that a Machine at large, on the same construction, has been used to good effect for the purpose of making Bricks, and that at least one hundred thousand Statute Bricks have been made therewith, to be produced to the Society on or before the first Tuesday in March, 1802.

121. BORING AND BLASTING ROCKS. To the person who shall discover to the Society a more cheap, simple, and expeditious Method than any hitherto known or in use, of Boring and Blasting Rocks in Mines, Shafts, Wells, &c. the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the Method having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in January, 1802.

122. GUNPOWDER-MILLS. To the person who, in the year 1801, shall invent and bring to perfection the most

most effectual method of so conducting the works of Gunpowder-Mills, in the business of making Gunpowder as to prevent explosion; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

CERTIFICATES and ACCOUNTS of the Method having been put in practice in one or more Gunpowder-Mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1802.

N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of Gunpowder-making, which fall short of the total prevention of explosion, and they are sent to the Society, for the sake of humanity the papers so sent in will receive due consideration, and such Bounty or Reward will be bestowed thereon as they appear to merit.

123. MILL-STONES. To the person who shall discover, in Great Britain, a Quarry of Stone fit for the purposes of Mill-stones, for grinding Wheat, and equal in all respects to that stone known by the name of FRENCH BURR; the GOLD MEDAL, or ONE HUNDRED POUNDS.

A pair of Mill-Stones, at least three feet eight inches diameter, with an account of the situation of the Quarry, and CERTIFICATES that not fewer than two pair of such Mill-Stones have been effectually used for grinding Wheat, to be produced to the Society on or before the first Tuesday in February, 1802.

124. HEATING ROOMS FOR THE PURPOSES OF MANUFACTURERS. To the person who shall in-

vent and discover to the Society a Method of Heating Rooms, superior to any hitherto known or in use, and at a moderate expense, for the purposes of Painters, Japanners, and other Manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the GOLD MEDAL, or FORTY GUINEAS.

A Model, or complete Drawing and Description of the Method, with CERTIFICATES that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1802.

125. IMPROVED VENTILATION. To the person who shall invent and produce to the Society a mode of permanently Ventilating the Apartments in Hospitals, Work-Houses, and other crowded places, superior to any now known or used; the GOLD MEDAL, or FIFTY GUINEAS.

A Model of the Apparatus, and a full Account of the means by which the effect has been produced, with proper CERTIFICATES, to be delivered to the Society on or before the last Tuesday in February, 1802.

Premiums offered for the Advantage of the British Colonies.

126. NUTMEGS. For the greatest quantity of merchantable Nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal to those imported from the Islands of the East Indies; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

Satisfactory CERTIFICATES, from the Governor or Commander in Chief, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in December, 1801.

127. The same premium is extended one year farther.

CERTIFICATES to be produced on or before the second Tuesday in December, 1802.

128. CINNAMON. For importing into the port of London, in the year 1801, the greatest quantity, not less than twenty pounds weight, of Cinnamon, being the growth of some of the Islands in the West Indies belonging to the Crown of Great Britain, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal in goodness to the Cinnamon brought from the East Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not less than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodness; together with satisfactory CERTIFICATES, signed by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the spot, their age, and the manner of culture, to be produced to the Society on or before the first Tuesday in January, 1802.

129. CLOVES. For importing into the port of London, in the year 1801, the greatest quantity of Cloves, not less than twenty pounds weight, of the growth of some of the Islands of the West Indies subject to the Crown of Great Britain, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal in goodness to the Cloves brought from the East Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not less than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodness, together with satisfactory CERTIFICATES, signed by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the spot, their age, and the manner of culture, to be produced to the Society on or before the first Tuesday in January, 1802.

130 The same premium is extended one year farther.

SAMPLES and CERTIFICATES to be produced on or before the first Tuesday in January, 1803.

131. PLANTATIONS OF BREAD-FRUIT TREES. To the person who shall have raised in any of the Islands of the West Indies, subject to the Crown of Great Britain,

tain, or in any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, between the first of January, 1800, and the first of January, 1801, the greatest number of Bread-fruit Trees, not fewer than one hundred, and have properly fenced and secured the same, in order to supply the Fruit to the Inhabitants; the GOLD MEDAL, or THIRTY GUINEAS.

Proper ACCOUNTS and CERTIFICATES, signed by the Governor, or Commander in Chief, of the methods made use of in cultivating the Plants and securing the Plantation, and that the trees are in a growing and thriving state at the time of signing such Certificates, to be produced to the Society, with Samples of Flour from the Fruit, on or before the first Tuesday in January, 1802.

132. The same premium is extended one year farther.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in January, 1803.

133. KALI FOR BARILLA. To the person who shall have cultivated, in the Bahama Islands, or any other part of his Majesty's dominions in the West Indies, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, in the year 1798, the greatest quantity of land, not less than two acres, with Spanish Kali, fit for the purpose of making Barilla; the GOLD MEDAL, or THIRTY GUINEAS.

134. For the next greatest quantity, not less than one acre, the SILVER MEDAL, or FIFTEEN GUINEAS.

CERTIFICATES, signed by the Governor, or Commander in Chief for the time being, of the quantity of land so cultivated, and of the state of the plants at the

time of signing such Certificates, to be delivered to the Society, with Samples of the Kali, on or before the second Tuesday in January, 1802.

135, 136. The same premiums are extended one year farther.

CERTIFICATES to be produced on or before the second Tuesday in January, 1803.

137, 138. The same premiums are extended one year farther.

CERTIFICATES to be produced on or before the second Tuesday in January, 1804.

139. DESTROYING THE INSECT COMMONLY CALLED THE BORER. To the person who shall discover to the Society an effectual method of destroying the Insect commonly called the Borer, which has, of late years, been very destructive to the Sugar-Canes in the West-India Islands, the British Settlements on the Coast of Africa, and the several Islands adjacent thereto; the GOLD MEDAL, or FIFTY GUINEAS.

The Discovery to be ascertained by satisfactory CERTIFICATES, under the hand and seal of the Governor, or Commander in Chief for the time being, and of some other respectable persons, inhabitants of the Islands, or other place, in which the remedy has been successfully applied; such CERTIFICATES to be delivered to the Society on or before the first Tuesday in January, 1802.

140. The same premium is extended one year farther.

CERTIFICATES to be delivered on or before the first Tuesday in January, 1803.

141. BOTANIC GARDEN IN THE BAHAMA ISLANDS. To the person who, before the first of January, 1801, shall have set apart, and, at his own private expense, shall have properly fenced and cultivated the greatest quantity of ground, not less than five acres, in any of the Bahama Islands, as a Botanic Garden, for the purpose of making experiments in the culture of those articles which are the peculiar production of the tropical climates, and which may tend to promote the commerce and manufactures of this country; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

It is required that any person claiming the foregoing premium should produce to the Society, on or before the first Tuesday in January, 1802, a CERTIFICATE from the Governor, or Commander in Chief of the Bahama Islands for the time being, of his having complied with the above requisitions, and that the Garden is in a proper state of culture at the time of signing such Certificate.

Premiums

Premiums offered for the Advantage of the British Settlements in the Eaſt Indies.

142. BHAUGULPORE COTTON. To the person who shall import into the port of London, in the year 1801, the greatest quantity, not less than one ton, of the Bhaugulpore Cotton, from which clothes are made in imitation of Nankeen, without dying; the GOLD MEDAL.

A quantity of the Cotton, not less than five pounds weight in the Pod, and five pounds carded, to be produced to the Society, with proper CERTIFICATES, signed by the Secretary to the Board of Trade of Bengal or Bombay, on or before the last Tuesday in February, 1802.

143. The same premium is extended one year farther.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the last Tuesday in February, 1803.

144. ANNATTO. To the person who, in the year 1801, shall import into the port of London, from any part of the British Settlements in the East Indies, the greatest quantity of Annatto, not less than five hundred weight; the GOLD MEDAL.

A quantity of the Annatto, not less than ten pounds weight, to be produced to the Society, with proper CERTIFICATES, signed by the Secretary of the Board of Trade of the respective Settlement, that the Annatto is the produce

produce of such Settlement, on or before the last Tuesday in February, 1802.

145. The same premium is extended one year farther.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the last Tuesday in February, 1803.

146. TRUE COCHINEAL. To the person who, in the year 1801, shall import into the port of London, from any part of the British Settlements in the East Indies, the greatest quantity of true Cochineal, not less than five hundred weight; the GOLD MEDAL.

A quantity of the Cochineal, not less than ten pounds weight, with proper CERTIFICATES, signed by the Secretary of the Board of Trade of the respective Settlement, that the Cochineal is the produce of such Settlement, to be produced to the Society on or before the first Tuesday in February, 1802.

147. The same premium is extended one year farther.

The SAMPLES and CERTIFICATES to be produced on or before the first Tuesday in February, 1803.

Additional Premiums in Colonies and Trade.

148. CULTIVATION OF HEMP IN UPPER AND LOWER CANADA. To the person who shall sow with Hemp (in Drills at least eighteen inches asunder) the greatest quantity of Land in the Province of Upper Canada, not less than ten acres statute measure, in the year

year 1801; and shall, at the proper season, cause to be plucked the Summer Hemp (or Male Hemp bearing no seed), and continue the Winter Hemp (or Female Hemp bearing seed) on the ground until the seed is ripe; the GOLD MEDAL, or FIFTY GUINEAS.

149. To the person who shall sow with Hemp (in drills at least eighteen inches asunder) the next greatest quantity of land in the same Province of Upper Canada, not less than five acres statute measure, in the year 1801, and shall, at the proper season, cause to be plucked the Summer Hemp (or Male Hemp bearing no seed), and continue the Winter Hemp (or Female Hemp bearing seed) on the ground until the seed is ripe; the SILVER MEDAL, or TWENTY-FIVE GUINEAS.

CERTIFICATES of the number of acres, the distance of the drills, of the plucking of the Hemp, with a general ACCOUNT of the expense, soil, cultivation, and produce, to be transmitted to the Society, certified under the hand and seal of the Governor or Lieutenant-Governor, together with twenty-eight pounds of the Hemp, and two quarts of the Seed, on or before the last Tuesday in February, 1802.

150. To the person, in Upper Canada, who shall sow with Hemp, in the manner above described, and with the same CERTIFICATES and SAMPLES, the next greatest quantity, not less than one acre; the SILVER MEDAL.

It is required that an accurate ACCOUNT of the expense of the culture, the nature of the soil, and quantity of the produce, be sent with the Certificates.

151.

151, 152, 153. The same premiums are extended one year farther.

CERTIFICATES, &c. as before mentioned, to be transmitted to the Society on or before the last Tuesday in February, 1803.

154, 155, 156, 157, 158, 159. Premiums, exactly similar in all respects to those held out for the Province of Upper Canada, are also offered for the Province of Lower Canada, and are extended to the same period.

160. CURING HERRINGS BY THE DUTCH METHOD. To the person or persons who shall, before January, 1802, cure the greatest quantity of White Herrings, not less than thirty barrels, according to the method practised by the Dutch, and equal in all respects to the best Dutch Herrings, the same being caught in the British Seas, and cured in a British Vessel or Port; the GOLD MEDAL, or FIFTY GUINEAS.

161. For the next greatest quantity, not less than fifteen barrels, the SILVER MEDAL, or TWENTY GUINEAS.

A sixteen-gallon barrel of the Herrings to be produced to the Society on or before the first Tuesday in February, 1802, with CERTIFICATES that the conditions of the Premium have been completely fulfilled, and that the whole were cured in the same manner as the specimen, together with a full description of the process employed, in order that the Society may judge how far the Dutch method has been adopted.

Society's

Society's Office, Adelphi, *June* 1, 1801.

Ordered,

THAT THE SEVERAL CANDIDATES AND CLAIMANTS TO WHOM THE SOCIETY SHALL ADJUDGE PREMIUMS OR BOUNTIES DO ATTEND AT THE SOCIETY'S OFFICE IN THE ADELPHI, ON THE LAST TUESDAY IN MAY, 1802, AT TWELVE O'CLOCK AT NOON PRECISELY, TO RECEIVE THE SAME; THAT DAY BEING APPOINTED BY THE SOCIETY FOR THE DISTRIBUTION OF THEIR REWARDS: AND, BEFORE THAT TIME, NO PREMIUM OR BOUNTY WILL BE DELIVERED, EXCEPTING TO THOSE WHO ARE ABOUT TO LEAVE THE KINGDOM.

IN CASES WHERE THE SOCIETY MAY THINK FIT TO ADMIT EXCUSES FOR NOT ATTENDING IN PERSON, DEPUTIES MAY BE SUBSTITUTED TO RECEIVE THE REWARDS, PROVIDED SUCH DEPUTIES ARE EITHER MEMBERS OF THE SOCIETY, OR THE SUPERIOR OFFICERS THEREOF.

GENERAL

GENERAL CONDITIONS.

As the great object of the Society, in rewarding individuals, is to draw forth and give currency to those Inventions and Improvements, which are likely to benefit the Public at large, Candidates are requested to observe, that if the *means*, by which the respective objects are effected, do require an expense or trouble too great for *General Purposes*, the Society will not consider itself as bound to give the offered *Reward*; but, though it thus reserves the power of giving, in all cases, such part only of any Premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the Candidates may be assured the Society will always judge liberally of their several Claims.

It is required that the matters for which Premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner the Claimant thinks fit, such Claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the Claimant's name and address: and all Candidates are to take notice, that no Claim for a Premium will be attended to, unless the conditions of the Advertisement are fully complied with.

No papers shall be opened, but such as shall gain Premiums, unless where it appears to the Society absolutely necessary for the determination of the Claim; all the rest shall be returned unopened, with the matters to which they belong, if inquired after by the Mark, within two years; after which time, if not demanded, they shall

shall be publicly burnt, unopened, at some meeting of the Society.

All Models of Machines, which obtain Premiums or Bounties, shall be the property of the Society; and where a Premium or Bounty is given for any Machine, a perfect Model thereof shall be given to the Society.

All the Premiums of this Society are designed for Great Britain or Ireland, unless expressly mentioned to the contrary.

The Claims shall be determined as soon as possible after the delivery of the specimen.

No person shall receive any Premium, Bounty, or Encouragement from the Society, for any matter for which he has obtained, or purposes to obtain, a patent.

A Candidate for a Premium, or a person applying for a Bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such Bounty, and be deemed incapable of obtaining any for the future.

The Performances which each year obtain Premiums or Bounties are to remain with the Society till after the public distribution of Rewards.

No Member of this Society shall be a Candidate for, or entitled to receive, any Premium, Bounty, or Reward, whatsoever, except the Honorary Medal of the Society. The Candidates are, in all cases, expected to furnish a particular Account of the subject of their Claims; and, where Certificates are required to be produced in claim of Premiums, they should be expressed, as nearly as possible, in the words of the respective advertisements, and be signed by persons who have a positive knowledge of the facts stated.

Where Premiums or Bounties are obtained in consequence of specimens produced, the Society mean to retain such part

part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No Candidates shall be present at any meetings of the Society or Committees, or admitted at the Society's Rooms, after they have delivered in their Claims, until such Claims are adjudged, unless summoned by the Committee.

N. B. The Society farther invite the communications of scientific and practical Men upon any of the subjects for which Premiums are offered, although their experiments may have been conducted upon a smaller scale than the terms of each require, as they may afford ground for more extensive application, and thus materially forward the views of the Society, and contribute to the advantage of the Public. Such communications to be made by letter addressed to the Society, and directed to Mr. CHARLES TAYLOR, the Secretary, at the Society's Office, in the Adelphi, London.

The Models required by the Society should be upon the scale of one inch to a foot. The Winchester bushel is the measure referred to for grain; and, as the acres of different districts vary in extent, it is necessary to observe, that the Society means Statute Acres, of five and a half yards to the rod or pole, when acres are mentioned in their list of premiums; and they request that all communications to them may be made agreeably thereto.

The Society desire that the Papers on different subjects sent to them may be full, clear, explicit, fit for publication, and rather in the form of Essays than of Letters.

*** In case any person should be inclined to leave a sum of money to this Society, by will, the following form is offered for that purpose:

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and to the intent that they, or one of them, do pay the same to the Collector for the time being of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

By Order of the Society,

CHARLES TAYLOR, Secretary.

☞ The Lists of the Premiums offered by the Society are published annually in the month of June, and may be had GRATIS, either on sheets or in pamphlets, by application to the Register, at the Society's House, in John-Street, Adelphi, London.

PAPERS

IN

AGRICULTURE.

AGRICULTURE.

THE GOLD MEDAL, being the Premium offered for planting ELMS, was this Session adjudged to HENRY VERNON, Esq. of Hilton-Park near Woolverhampton, from whom the following Account and Certificates were received.

SIR,

I HAVE for many years planted about thirty acres of different sorts of Trees in the course of the year, and my plantations are in the most thriving state.

Ever-green Trees I transplant in the early part of August, and am perfectly convinced, by long experience, it is the most proper season to move them. I have often known gardeners, who have examined them the following year, say,

" It surely could not be possible they were moved the preceding year." The leading shoot droops on being first transplanted; but, after two or three refreshing showers, it recovers and throws forth roots, so as to make the Tree firm before winter.

With respect to the distance between my Elms, it depends on the number of other sorts of Trees that I may have to intermix with them. I plant one Tree, as near as possible, four feet from another. I intermix Scotch and Spruce Firs with all my Trees, and cut them away when they in the least are observed to injure other plants.

In the plantation below Essington Windmill, I judge the Elms may be about fifteen feet distant from each other; in one of the clumps on Essington Wood, they are, I think, forty feet distant from each other, and the others at least eighty feet, from the number of Trees mixed with them. Should your

Society

Society consider the inclosed as entitled to their honorary premium, it will highly flatter,

SIR,

Your obedient Servant,

HENRY VERNON.

Lower Wimpole-Street,
March 26, 1801.

Mr CHARLES TAYLOR,

THIS is to certify, That between the 24th of June, 1798, and the 24th of June, 1799, the following pieces of Land were planted with English Elms, from three to seven feet high.

One piece of Land, in quantity twelve acres, two roods, twenty-five perches, called the Brick-kiln Plantation, was planted with different sorts of Trees; and amongst others with English Elms. Very few died; and there are now living

four thousand English Elms, which have a very healthy appearance.

The Brick-kiln Plantation was taken off a Common, called Essington Wood. It was ploughed very deep, about three months before it was planted. The soil is part of it clay, and the other part gravel: those on the latter succeed best in all respects.

Another piece of Land, called the Castle Ring, containing eleven acres, two roods, two perches, was also planted with different sorts of Trees; and amongst them were many English Elms, on which there are now living two thousand in a very thriving state.

The soil is gravel and loam. This plantation was also taken from Essington Wood Common. Nearly one half of it was ploughed very deep, in the August before it was planted; the other part was left in the state in which it was found. The trees succeed best on the ploughed part.

Both

Both these plantations are very effectually secured against every sort of cattle, by a ditch five feet wide and three feet deep, with oak posts and double rails wound with gorse and thorns, and every where quicked with a double row of fine plants seven years old.

There is also a third plantation under Essington Wind-mill Bank, consisting of very rich light loam, and containing seven acres, two roods, eight perches, of old inclosed Land, that had not been in tillage in the memory of man. This I planted between the 24th of June, 1798, and the 24th of June, 1799, with many different kinds of Trees; amongst others, with English Elm, of which there are now living, in a very flourishing state, five thousand six hundred.

These plantations are in the liberty of Essington, and parish of Bushbury, in the county of Stafford. Witness,

LAWRENCE GRAY.

THIS

THIS is to certify, That Henry Vernon, Esq. has planted, on the different Lands mentioned in the county of Stafford, the number of Trees specified by Mr. Lawrence Gray; that I have walked over the Plantation, with the gardener, and found the same in a very thriving state. The plantations are uncommonly and effectually well fenced and secured to grow Timber; as witness my hand, this 24th day of March, 1801.

JOHN CLARE,
Vicar of Bushbury and Essington.

The

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, being the Premium offered for planting Osiers, was this Session adjudged to Mr. THOMAS SELBY, of Otford Castle in Kent, from whom the following Account and Certificates were received, and who made choice of the Pecuniary Reward.

SIR,

UNDERSTANDING that a Premium has been offered, by the Society for the Encouragement of Arts, &c. for planting the greatest number of acres with Osiers, I beg leave to offer myself as a Candidate for that Premium; and to lay before the Society, the mode I have adopted in planting a field of twenty-one acres. The soil is very different in quality. In some places it is a sandy loam; and, in others, a reddish clay: in some it is a sandy bog; and, in others, a black

a black moory bog. The sub-soil consists of very stiff clay, and sharp reddish clay. The plants are of three sorts, the New Kind, the Osier, and the Willow. They are planted in rows two feet by one, and about 20,000 per acre. Those planted in March 1800, flourished five months after, and are in good condition at present. The land, as may be supposed from the description, is very wet; my apology for which is, that it has been in my occupation only one year. I am perfectly convinced that all wet land that is worth farming, is likewise worth draining; and therefore am now draining this piece of land.

The Osier thrives best, the New Kind next, and the Willow the worst. All the three sorts invariably thrive best on the dryest spots in the field. The expence attending the planting and the sets planted was five pounds per acre, by contract, and I prepared the land. I shall be happy, at all times, to answer any

any questions which you may think fit to propose concerning them, whether I am the successful Candidate or not.

I am, SIR,

Your most obedient

humble Servant,

THOMAS SELBY.

Otford Castle, near Seven Oaks, Kent,
November 18, 1800.

Mr. C. TAYLOR.

The preceding Statement is confirmed by the Certificates of

NATH. GEORGE WOODROFFE, A. M. Curate of Otford;

WM. WALLER, Churchwarden;

JOHN COOPER, Seven-Oaks, the Planter.

The

The GOLD MEDAL, being the Premium offered for sowing, planting, and inclosing Timber-trees, was this Session adjudged to THOMAS JOHNES, M. P. of Hafod, from whom the following Accounts were received.

Account of Trees and Acorns planted by THOMAS JOHNES, *Esq. of Hafod, in Cardiganshire.*

FROM June 1796, to June 1797, 250,000 Trees were planted; of which 20,000 were three-years-old transplanted Alders, 30,000 one-year-old transplanted Alders; the others were Elm, Beech, Birch, Ash, and Mountain Ash.

The mode of planting was as follows: After the ground was well inclosed, a man, with a spade, made two cross cuts in the sod (the ground not being previously ploughed or otherwise prepared); he

he was followed by a boy with a bundle of the trees; the plants were in size from nine to twelve inches: the boy placed one of them in the gap, caused by the raising of the spade; the man then pressed the sod close down with his feet, which completed the business. About 10,000 were planted to the acre.

The soil is various; from a light gravel, to a peat bog. All trees thrive well therein, if properly secured; but Larch and Beech seem to flourish most. *

Between October 1798, and April 1799, fifty-five acres of good ground were

* It may be proper to remark that Mr. Johnes had planted in the same year 400,000 Larch Trees, not noted in the above account, as he had received the Gold Medal for them the preceding Session, and an account of them was inserted in the XVIIIth Volume of the Society's Transactions.

A further account of this gentleman's general Plantations and extensive Improvements, will be found in the Preface to the present Volume.

An ingenious Pamphlet by George Cumberland, Esq. entitled "An Attempt to describe Hafod," was printed in 1796, and is sold by T. Egerton, Whitehall.

were set or planted with Acorns, besides 165,000 Trees in the same time.

The Acorns were planted by a man with a spade paring off a thin turf and throwing it over, afterwards driving his spade two or three times into the ground to loosen the earth, then lifting up a spade full, whilst a boy was ready to throw in two or three Acorns; the earth was then gently trod down with the foot. The Acorns were planted two feet asunder.

The greatest part of the plantations is fenced with a stone wall, five feet high; the remainder, with a turf fence, the same height.

Certificates were sent from James Todd, gardener to Mr. Johnes, and the Rev. Lewis Evans, Minister of Eglwys Newydd, confirming the above; and stating that the plants were growing exceedingly well and in full vigour.

The

The Silver Medal or Twenty Guineas, at the option of the Candidate, being the Premium offered for the Cultivation of Spring-Wheat, was this Session adjudged to Mr. Robert Brown, of Markle, in the Parish of Preston and County of Haddington, Scotland, from whom the following Account and Certificates were received, and who made choice of the Pecuniary Reward.

*** *This Communication will particularly demand the attention of the Farmer, when bad seasons prevent the autumnal sowing of Wheat.*

Samples of the Wheat may be seen, by application to the Register, at the Rooms of the Society.

An Account of the Management of several Fields of Spring-Wheat, belonging to Mr. Robert Brown, Farmer, at Markle, near Haddington.

THE autumn and winter of 1799 being extremely wet, rendered the sowing of Wheat, except in a few situations, almost impracticable. I therefore determined to postpone sowing my Wheat-seed till the spring months; trusting, as my ground was in good condition, that if the weather was then favourable, I could get the business accomplished in a proper manner. The land was therefore ploughed in as good order as possible; and from the uncommon frosts which afterwards prevailed, it turned very mellow and fine when dry weather arrived.

About the 20th of February, 1800, I commenced sowing, which was continued, as circumstances permitted, till the

the middle of March; and in that time one hundred and forty-five acres were sown, besides ten acres afterwards ploughed down. The soil of the greatest part of the land thus sown, was a deep loam incumbent upon clay; and the remainder was a lighter loam upon a gravelly bottom. Thirty acres had been summer-fallowed, limed, and dunged, the preceding year. Ninety-five acres were after a crop of drilled beans, which had been completely horse-hoed. Fourteen acres had been occupied by turnips and potatoes, both drilled and horse-hoed; and six acres had carried summer tares. None of the fields received more than one ploughing, after the preceding crop was removed, except those under summer fallow; which had seven ploughings, and were manured with fourteen double-horse cart-loads of dung, and three hundred bushels of shell-lime per acre.

The kind of Wheat sown was principally the Essex White and Egyptian

Red, which in shape of head and size of grain are nearly similar. Some of the White Wheat was of the Kentish variety, which from being long sown upon the farm, was much blended with Red Wheat. The crop upon the heavy loams was, with a few trifling exceptions, uniformly good. The light loam was much hurt by the growth of yellow weeds, which last year prevailed upon such soils in an uncommon degree. The whole was ready for the sickle about the first week of September, and was cut from the 3d to the 12th of that month. A sample of the Essex kind accompanies this Paper.

From the small quantity yet threshed, the produce cannot be exactly ascertained; but, from trials which have been made, it is supposed that the fields sown after summer fallow, will yield forty bushels per acre; those sown after beans, thirty-six bushels; and those after tares, potatoes, and turnips, twenty-four bushels.

bushels. The last being upon the dry soil were much injured by the drought and yellow weeds, while the deep loam was rather benefited by the dry weather.

The weight of the grain already threshed, is nearly sixty-two pounds per Winchester bushel.

The inferences which may be drawn from the above statement, are,

First, That Wheat may be sown with advantage in the spring months, till the middle of March, if the weather is then dry, the land in good condition, and the succeeding summer moderately warm.

Secondly, That under the above circumstances, the period of harvest is not retarded above ten days by the late sowing, especially in favourable seasons.

Thirdly, That the grain produced from spring crops of Wheat is equally good in quality, as that sown in the autumn and winter months.

WE, Alexander Dods, farmer in Newmans, and Andrew Somerville, farmer in Athalstoneford-maine, in the parish of Athalstoneford, in the county of Haddington, Scotland, do hereby certify that the several fields of Spring Wheat, mentioned in the statement given in the preceding pages, and belonging to Robert Brown, farmer at Markle in this county, were cultivated and managed as therein stated; and that the different circumstances connected with the management of the said crop of Wheat, are faithfully described; as witness our hands, this 2d of December, 1800.

Alexander Dods.
Andrew Somerville.

THIS is to certify, that I have measured those fields that were sown with Wheat, last spring, upon the farm of Markle in the parish of Preston, and

and upon the farm of West-Fortune in the parish of Athelstoneford, both in the county of Haddington, as the same are possessed by Robert Brown, Esq. and find the contents, in English statute acres, to be as under, viz.

	A.	
On the farm of Markle - -	117	90
On West-Fortune - - - -	27	51
Amount in Acres	145	41

William Dickinson,
Land Surveyor.

The THANKS of the Society were this Session voted to Mr. JOHN TAYLOR, of Manchester, for the following Account of the Method of making Clover-Hay in wet weather, as practised in Courland.

An Account of the Method of making Clover-Hay, invented by the Rev. Mr. Klapmeyer, of Wormen, in Courland; communicated to the Secretary, by his Son Mr. John Taylor.

IN the method of making Hay, recommended by the Rev. Mr. Klapmeyer, not only a number of hands are saved, but the Hay is better and more nourishing. The Hay is prepared by self-fermentation, whereby it retains its nutritious juices, and only loses its watery particles; it is dried more expeditiously by dissipation of its humidity, and contraction of the sap-vessels,

vessels, and thus its nutritious juices are concentrated. This process is conducted in the following manner, viz. The sap-vessels are expanded by the circulation of the liquid juices by heat, and the superfluous humidity is exhaled: on cooling, the sap-vessels contract, and thus future intestine fermentation is prevented, and the nutritious quality preserved.

Upon this principle, the Clover intended for Hay, after having been mowed, remains till four o'clock in the afternoon of the following day, in the swath, to dry; it must then be raked together into small coils, and afterwards made into large cocks in the form of a sugar-loaf, and such as would require six or eight horses to remove. To prevent the air from penetrating these cocks, and to produce a quicker fermentation, they must, whilst forming, be trod down by one or two men. If it be a still close warm night, the fermentation

tation will commence in four hours, and manifest itself by a strong honey-like smell: when a proper fermentation is begun, the cocks will, on being opened, smoke, appear brownish, and may then be spread abroad. If in the morning the sun is warm, and a little wind arises, the Clover-Hay will quickly dry; it may then, towards noon, be turned with the rake or pitch-fork, and, about four in the afternoon, will be sufficiently dried, so that it may be immediately carted into the barn, without any danger of a second fermentation.

By this method of management the Clover will require only three days, from the time of mowing, to its being housed, and very little work: whilst in the common way, even in good weather, it requires six or eight days; in the old method it frequently becomes of a black colour; but in the new method it is only brown, has an agreeable smell, and remains good and unchangeable in the barn.

barn. The farmer has also another advantage, that if he has not carts enough to carry it into the barn, he needs only, at sun-setting, to heap it again into large well-trodden cocks, and thatch them with straw, in which state they will remain the whole summer without damage or loss. This Clover-Hay is not only greedily eaten by sheep and lambs, but also by horses, calves, and cows.

The last in particular prefer it to the best Meadow-Hay: it produces a great quantity of rich milk; and the butter made from it, is almost as yellow as summer butter.

As this new mode of making Hay depends principally upon two circumstances — first, that the mown Clover, when brought together into large heaps, may ferment equally and expeditiously; secondly, that if the day succeeding the fermentation be dry, sunny, and windy— on this account it may be proper to point

out

out what should be done when circumstances are unfavourable.

Let us suppose, therefore, that the night after the Clover-Grass has been placed in the great cocks, be cold, damp, or rainy, the fermentation will yet take place, although it may require a term of twelve, sixteen, or twenty-four hours to effect it. If it be a second or third crop, at which season the nights are colder, it may even require from thirty-six to forty-eight hours before the fermentation ensues: it will however commence, and may be ascertained from this circumstance, that you can scarcely bear your hand in the interior of the cock.

Even if the night be dry, yet if a strong cold wind blows, the cock may not ferment equally, but only in the middle and on the side opposite to the wind; the other parts may still remain green. In such a case the following rules must be attended to:—

First,

First, If the cock has only fermented in the middle, and on that side where the cold wind did not act upon it, the whole heap must nevertheless be opened the following morning. That which has already fermented must be separated and spread to dry; it must be turned towards noon, and may be carted into the barn in the evening: but that part of the cock which has not fermented, must be again put together into large cocks, and fermented in the same manner as the preceding part, after which it may be spread to dry, and brought into the barn.

Secondly, In such cases where a small portion of the cock has fermented thoroughly, but not the greater part, the heap must be spread abroad in the morning, but must be again made into a close cock in the evening, in such a manner that the part which has fermented be placed at the top or outside of the cock, and that which has not fermented

mented be inclosed within it; then on the ensuing morning, or, if the weather be cold and rainy, on the morning afterwards, the Clover heap may be again spread abroad, and the Clover treated as in Case N° I.

Thirdly, If, in spreading the heap abroad, it be found that nearly the whole of the Clover has fermented, it will not be necessary to delay the housing of the whole on account of some small portion; but the Clover may be dried and carted into the barn. The small portion of Clover which remained unfermented, will not occasion any disaster to the other which has fermented; for there is a material difference betwixt hay thus managed, and the meadow grass which is brought whilst damp, or wet with rain, into the barn, which will grow musty and putrid.

Fourthly, In such instances, where some of the cocks of Clover have thoroughly fermented, and it rains on the

the morning, they ought to be spread abroad, for the Clover must be opened and spread, even if it rains violently; since, if it was suffered to remain longer in the heap, it would take fire, or its juices would be injured by too much fermentation; the leaves and stalks would become black, and the Clover unfit for food: therefore, if the rain continues, the spread Clover must be turned from time to time, but not carted into the barn till dry. This drying takes place, if the rain discontinues for a few hours, much more expeditiously with the Clover which has fermented, than with that made in the common way. Besides which, it must be remarked, that the fermented Clover remains good, even if it continues some weeks exposed to the rain, provided it is at last suffered to dry before it is put into the barn; otherwise the wet from the rain will render it musty and bad. The Clover which has been for so long a time exposed

to

to the rain, will not, however, be so nutritious as that which has been well fermented and sooner dried; but it will be far superior to that which has been exposed to the rain, and got up in the common method.

This new mode has been adopted with success, during the years 1798 and 1799, in Silesia, and found, in every respect, preferable to the old manner. On one of the estates there, it rained much during the Hay time; they were obliged to spread the Clover out of the large cocks, owing to its having fermented only in the middle: the parts which had not fermented were carefully separated and made again into large cocks, which fermented at the expiration of thirty-six hours, rainy weather and cold nights continuing during this period; after which time it was again spread abroad. The former, as well as the latter, remained for three days exposed to the rain, during which period it was turned

turned several times; the rain ceased on the fourth day, so that the Clover-Hay was turned towards noon, and carted into the barn that evening. This Clover-Hay remained in the hay-loft without change, and was a very nutritious food. Several milch-cows were fed with it, who not only eat it greedily, but also increased in their milk. Lambs and calves also thrived with it greatly. This method of making Clover-Hay prevents its taking fire; for Clover which has been once well fermented and dried, does not change or spoil in the hay-loft.

Thus far I have given you the practice related by Mr. Klapmeyer; and if the hay season be wet in Lancashire, as is generally the case, I recommend you to make the trial on your farm.

If the weather should be remarkably hot, you may, by adopting this plan, prevent a frequent accident; for grass hastily made into hay, however dry it may appear to the hand, contains within its fibres

much humidity; and when trod down in the stack will ferment rapidly, from this humidity endeavouring to escape, which often fires the stack. A certain degree of fermentation is necessary in the making of Hay, in order to develop its saccharine qualities, and make nutritious food. This saccharine fermentation is evident, from the smell and colour of the Hay in common stacks; and from tasting an infusion of it, it resembles, in some degree, the process of making malt from barley, and requires a similar attention. I have no doubt that the method above related will prove generally advantageous, in making Clover-Lucerne and Meadow-Hay in England, and lead to valuable improvements in Agriculture.

I remain

Yours very affectionately,

JOHN TAYLOR.

Leipsig, June 4, 1800.

Mr.

Mr. JOHN PALMER, of Maxstock near Coleshill, in Warwickshire, furnished the following Communication of a Method of HARVESTING CORN in WET WEATHER. Mr. PALMER did not comply with the Conditions prescribed for the whole of the Premium offered; but as the Society were of opinion that the Method he used would be serviceable, if more generally known, the SILVER MEDAL was adjudged to him as a Bounty.

SIR,

I MUST request the favour of you to lay before the Society for the Encouragement of Arts, &c. the following Account and Certificates, in claim of the Premium offered for the best and cheapest method of harvesting Corn in wet weather. The mode I have adopted is simple and effectual, and will, I hope, be approved.

The weather proving extremely rainy, and my Corn then standing taking much damage, I determined upon cutting it wet, and thrashing it immediately, and then drying it on a kiln: in consequence of this, I collected as many men as were sufficient for the purpose, and employed them as follows, viz.

I caused a part of my men to cut the Corn in the common method with sickles, and bind it into sheaves. A second part I employed to load it on waggons, and carry it to the barn; and as many as could work in the barn, to thrash it. The next morning I winnowed it, and carried it to a malt-kiln to be dried; which operation was always completed in less than twenty-four hours.

As it is impossible for me to send you two sheaves of the Corn harvested as above described, I have sent you the produce of two sheaves and upwards, which I declare to be a fair sample of the produce of four acres and upwards.

A timber

A timber-stove, or a hop-kiln, will answer the purpose of drying Corn equally well as a malt-kiln.

The Expense per Acre was as under stated.

	£.	s.	d.
Reaping and carrying to the barn	0	12	0
Thrashing and winnowing - -	0	12	0
Kiln-drying - - - - - - -	0	5	0
	1	9	0

N. B. Only a part of the above sum should be charged to my new method of harvesting Corn, viz. the extra expence, which is as follows:

Five shillings per acre for drying, and four shillings for the extra trouble of thrashing it.

After the Wheat above mentioned was thrashed in the common method with flails, and dried, I so far completed a machine for thrashing, that I thrashed a very considerable quantity of Wheat,

and ten acres of Barley with it, carried from the field in November; and it was dried in the manner described in my claim. I did not however state this to the Society, because I had taken out a patent, dated the 6th of December, 1799, for my thrashing-machine; and was that day going to London to give in my specification, dated the 4th of January, 1800.

Part of the straw of the four acres, described in my claim, was used for thatch immediately after it was thrashed; and part stacked in small narrow ridges, for litter for my fold-yard.

The grain was very well separated from the straw by the flails; but that thrashed by the machine was completely cleared, though in a very wet state. This would not be the case with the common machines of the North.

The quantity of Wheat upon an acre, was about twenty-one bushels, which is nearly as much as there would have been,

if

if it had been dried by fine weather. When the advantage of getting in an acre of Wheat per day, in seasons like the last, is properly considered, and making it immediately useful, at the small additional expence of nine shillings per acre, there can be but little doubt respecting its utility; for probably these men could not be employed at any other work.

I am, Sir,

Your humble servant,

JOHN PALMER.

Maxstock, 24th May, 1800.

Mr. CHARLES TAYLOR.

The above letter was accompanied with three Certificates; one from Mr. Edward Palmer, of Maxstock in the county of Warwick; another from the Rev. John Dilke, of Maxstock Castle; and the third from Mr. William Twam-

ley, of Sutton Colfield in the county of Warwick, miller: which testify that Mr. John Palmer did harvest four acres of Wheat and upwards, in the year 1799; that his plan is likely to be of general advantage; and that his thrashing machine is in high repute, and answers every end proposed.

The

The GOLD MEDAL, being the Premium offered for improving Land lying waste, was this Session adjudged to THOMAS FOGG, Esq. of Bolton in the Moors, Lancashire, from whom the following Account and Certificates were received.

SIR,

THIS is to certify, that Mr. Thomas Fogg, of Bolton in the Moors, in the county of Lancaster, manufacturer, has made the following improvements upon some Waste Land belonging to him, situated in Edgeworth, in the said county, viz.

	£.	s.	d.
Expences—In walling fences 500 roods, 8 yards to the rood, from 5 to 6 feet in height, at 8s. 6d. - - -	212	10	10
Expences—6½ statute acres covered with stone drains, at 3s. per rood, 8 yards to the rood The same ditto with black soil, lime, and dung, at 6s. per rood, in all 9s. per rood - - -	221	17	0
Carried over	£.434	7	10

	£.	s.	d.
Brought over -	434	7	10
This land was worth about 5s. per statute acre in its original state, being of the nature of black soil, producing bent, and is now good meadow and pasture land, and valued at £3. per statute acre.			
Expences of 13 statute acres covered with black soil and lime, of sufficient depth to have carried a crop of oats, which was sown with grass seeds, supposed to have cost 6s. per rood,	294	18	0
This land was worth about 3s. per acre in its original state, being of the nature of black and hazel soil, and producing black heath and bent, and is worth about £2 : 2s. per acre.			
Expences—2 statute acres of land fenced out, and sets found for many poor people to plant for potatoes, at £.10 per acre - - - - -	20	0	0
This land was worth about 2s. per acre in its original state, being of the nature of black soil, and producing nothing but rushes, and is now worth about £2 : 2s. per acre.			
	£.749	5	10

	£.	s.	d.
Brought over -	749	5	10
Expences—3 statute acres of land planted with timber of different descriptions, which seem to be in a flourishing condition. This land is fenced with double rails and brush-wood, to keep the west and north winds from the trees. It cost more than £.20 per acre - - - - -	60	0	0
This land was worth about 2s. per acre in its original state, being of the nature of black soil, producing bent grass.			
Expences—26 statute acres levelled and drained with open and covered drains, at present very dry, and the next spring will be ready for any sort of manure, which we believe cost about £200. - - -	200	0	0
This land was worth about 2s. per acre in its original state, being of the nature of black soil, and producing black heath and bent grass, and is now worth about £1. 11s. 6d. per acre.			
Total -	£.1009	5	10

N. B. We believe that there are not less than 500 cart loads of soil collected, and ready to be laid on the said 26 acres

acres of land, the next spring, together with other manure; also that the above improvements have been made, and money expended, since the beginning of the year 1794.

The above account of expenses upon the above Land, as shewn to us by the said Mr. Thomas Fogg, we believe to be true; and the improvement of the Land we are well acquainted with; as witness our hands, this 4th day of December, 1800.

AMOS OGDEN, Minister of Turton.
JOHN HORROCKS.
JOHN ASHWORTH.

Signed in the presence of
EDWARD CROMPTON.

SIR,

I HEREWITH send you a description of the Waste Land I have inclosed from the Common called Edgworth Moor, in the parish of Bolton, and county of Lancashire, by an act of Parliament, granted

granted for that purpose; and also an account of the Method which I have taken for the improvement of the said Waste.

Upon one of the small plots I have built a farm-house, cow-house, and a room above for hay.

Five of the plots were all of similar black soils; the situation, a gentle descent to the south, of about one inch to the yard. One of these plots I manured upon the green swarth; but the soil being too wet, it did not answer my expectations. I then drained all the five plots with stone, laying bottoms underneath. The main-drains opened about two feet square, and smaller drains are directed into them. I afterwards covered the land with compost made from lime, soil, and black dung, which answered very well; and they are now as good meadow and pasture lands as any in the neighbourhood.

On

On a small plot I have walled out a nursery for plants, in which I have about 6000 two-year-old and one-year-old trees: these I take up and plant out as I have occasion.

Two of the plots were alike very bad and bare of soil, they produced nothing but bent-grass. On many parts of them there was no soil, large beds of rocks appearing on the surface: these I got up, and made part of the walls with them, levelling the land at a great expense. I then covered the ground with a compost of lime and rich black soil, produced from decayed timber and vegetables; which soil I dug out of one part of the premises. With the above compost I covered the two plots, from three to four inches thick. The cattle seem to like this pasture better than any of my old inclosures. It has a south aspect, falling from north to south three or four inches in a yard.

Another

Another plot I have improved upon the same plan as the two last, and have no doubt of its answering: but as it has been only done this year, I must attend until the next year to ascertain it. It has a north-east aspect, with a fall of about one inch to the yard from the south.

Two other plots were very boggy and full of small pits, whence peat had been got. Many places were not passable, being full of water: these lots I have levelled and drained with open drains, at a great expense, as they would not bear the cattle to tread upon them. I first made a large drain, which answers the purpose of a fence: it is three yards wide at top, one at the bottom, and two deep. I then cut small drains directed into it, about four yards asunder; with the soil from which I filled up the pits, and where the land wanted I put it sometimes on the middle of the butts, after hacking it small. These small drains

drains are about one foot in width, and from twelve to eighteen inches deep; taking care not to go into the clay. These small drains are cut by a line: I paid for them 1½d. per rood, of eight yards. These plots have a north-east aspect, with a gentle inclination from the south. They are now as dry as any land I have, and fit for any manure; I have about 500 loads of soil heaped up for that purpose, which I mean to mix with lime next spring.

Another plot, which is nearly flat, I have drained with open drains, and levelled the land, which is now dry enough for tillage.

Another part I have planted with Black Italian Poplar, Lombardy Poplar, Beech, Scotch-Fir, Larch, Sycamore, Ash, Alder, Huntingdon-Willows, and a few Oaks; they flourish well in general: the Larches seem to thrive best, and the Sycamore next. This plantation is double-railed to the west: I have platted brush-

brush-wood in the rails, and fastened it in the ground.

I drained other parts of the land which were mossy, and planted one plot thereof, which had from three to four feet deep of good black soil, with potatoes. A person of the name of Duckworth, who is unacquainted with my application to your Society, told Mr. John Ashworth, of Turton, the Secretary to the Manchester Agricultural Society, that he had weighed the potatoes grown in two different places of it, and the produce was above 7¼lb. to a square yard upon the average.

I remain, SIR,

Your most obedient servant,

THOMAS FOGG.

Bolton,
December 31, 1800.

MR. CHARLES TAYLOR.

SIR,

I WAS duly favoured with yours, acquainting me that the Society of Arts had adjudged me the Gold Medal, or the Silver Medal and Twenty Guineas, for my Improvement of Waste Land. I beg leave to inform you that I shall make choice of the Gold Medal, both for the honour it confers, and the good effect it may have on others, in this part, by stimulating some of my neighbours who hold a large quantity of the same description of Waste Land, and who can well afford to improve it.

About Christmas last I begun to prepare about three acres of Waste Land, adjoining to what I had last year in potatoes, which will make about five acres. As I mean to plant the old ground also, I caused the fresh land to be dug up, which appears to be much mellowed by the frost, which has been of great service to it. Potatoes are very dear at present

present in this neighbourhood. Last year, in order to save the principal part of the root for the use of the table, I procured what is called a cheese-tryer, by which I had the best of the eyes taken out, with little damage to the potatoe.

With those sets I planted about twenty roods upon Bolton-Moor, along with others cut according to the custom of this part; that is, the whole root cut away to the eyes. This method the growers in general most approve of; but those cut out by the cheese-tryer, were equally as good a crop as the others. A neighbour of mine, Mr. James Carlile, pared a quantity so deep as to take the eye fairly out, last year, and planted them; first cutting from the eye nearly all the parings. These, he says, answered, and were as good a crop as those cut upon the old method. I have such confidence in seed thus cut, that what has been used for some time in my house, has been pared

that way. I am of opinion, that the parings, if put either in dry sand or ashes, will be preserved till they are wanted. I mean to give them a fair trial this season, and shall take the liberty of communicating the result to the Society.

I remain, SIR,
Your most obedient
humble servant,
THOMAS FOGG.

Bolton,
February 28, 1801.

Mr. CHARLES TAYLOR.

The

The Thanks of the Society were this Session voted to his Grace the DUKE OF BRIDGEWATER, for a Model of a Drain-Plough, presented by him to them, and sent with the following Communication from his Grace's Agent, Mr. Thomas Bury, of Worsley Mills, near Manchester.

The Model, which is made upon a scale of one inch to a foot, is placed in the Society's Repository for public inspection.

SIR,

I AM favoured with yours of the 15th instant. The model of the Guttering-Plough sent you, was a present to the Society from his Grace the Duke of Bridgewater, made by Robert Tomlinson, one of his Grace's constant workmen.

I procured the following account this morning from the Duke's farmer:—In clay or stiff land that lies flat, the plough cannot go too deep; but if it lies on a declivity, about five inches deep is sufficient. In soft light soil, the Plough should go as deep as it can in all situations, because the sides moulder into the gutters. The best time of draining is about Michaelmas, or as soon as the grass is eaten; and the whole should be accomplished betwixt that time and Christmas.

In clay ground that has never been drained, six good horses will be requisite to draw the Plough. In every following year the Plough should be run through the same gutters, and four horses will then be sufficient.

I am, Sir,

Your most obedient servant,

Thomas Bury.

P. S The

P. S. The Share of the Plough must be well steeled, and should be ground sharp.

Worsley,
September 18, 1800.

Mr. Charles Taylor.

*** At Broughton, in the neighbourhood of Manchester, considerable quantities of stiff clay, pasture, and meadow land, have been much improved, under the inspection of the Secretary of the Society, by the use of this Plough.

After the cattle were housed for the winter, three horses were employed to form drains with the Plough at proper intervals: the small drains were made at the distance of about nine yards from each other, in old furrows of the ground, and about five inches deep: the sod, when cut out by the Plough, was of a wedge-like form, and turned out by it

upon the ridges of the land, entirely separated from the drain or gutter. These sods were afterwards divided across, by a spade, into lengths of about two feet each, then tossed by a pitch-fork into a cart, and placed in a heap in the field, along with strata of quick lime in a powdery state: the whole mass was reduced to a compost by the frost during the winter, and in the following spring was laid upon the surface of the land, and formed an excellent top-dressing.

The water from the small drains was directed into larger drains, made by lowering the share of the Plough to the depth of nine or more inches. Little or no loss of land arose from the small drains, as natural grasses were produced therein, early in the spring. It will be highly advantageous to repeat the operation every winter: it is easily and expeditiously performed; and no person, without an actual experiment of the fact,

fact, can form a sufficient judgment of the great benefit arising to vegetation by the removal of cold stagnant water, during the winter, from land of every description.

Description of the Duke of Bridgewater's Drain-Plough, Plate I. Fig. 1.

A B. The beam of the Plough.
C D. The handles.
E. The share or sock.
F. The coulter, or first cutter of the sod; which coulter is fixed to the share.
G. The other coulter, or second cutter, which separates the sod from the land, and directs it through the open space betwixt F and G. This coulter is connected with the share and the beam.
H I. The sheath of the plough.
K. The bridle or muzzle, to which the swingle-tree is to be fixed.

LM. Two wheels of cast iron, which may be raised or lowered by screws at N, pressing upon the flat irons O O, to which the axis of each wheel is fixed. These wheels regulate the depth which the share is to penetrate into the earth.

P. A chain with an iron pin, to move the screws at O.

The

The SILVER MEDAL was this Session voted to THOMAS ANDREW KNIGHT, Esq. of Elton, near Ludlow, for his Invention of a DRILL MACHINE for sowing Turnip-seed; a Plate of which is annexed to the following Description of its form and mode of application. A complete Machine was presented by him, and is placed in the Society's Repository.

SIR,

I HAVE sent you a small instrument for sowing Turnips, which I have tried on several different soils, and think I can venture to assert, that it will sow the seed and cover it perfectly well, in any soil that is nearly in a proper state to receive it. It is necessary either to harrow the ground *across*, or to roll it, previously to the instrument being used, that the labourer may see the rows he has

has made; but I have always found the crop to succeed better after the roller than after the harrow, though the ground has been very strong.

The instrument is so extremely simple in its construction, that it is almost unnecessary to give a description of its mode of action; but as parts of it may probably be broken in carriage, I have added the following sketch:—*See Plate I. Fig. 2.* A, the iron wheel, which, running on its edge, formed by two concave sides, makes the groove into which the seeds fall. I have sometimes used a wheel with strait sides; but I think that concave sides, when well executed, are to be preferred in strong soils, and indeed in any soil. B is a wheel moving on the same axis with A, and turning the wheel C (which gives out the seed) by means of a strap. I have several sizes of the wheel B, in order to increase or diminish the rapidity of C; and consequently to sow more or less seed. D,

the

the tube through which the seed passes, and falls into the channel made by the iron wheel. E, the feet of the instrument. F, six lengths of jack-chain; which I find cover the seed remarkably well. The chain is perhaps preferable to any kind of harrow, because it can never become encumbered by loose straw, which is almost always found on or close to the surface, when the ground has been manured; and the iron cutting-wheel has a similar advantage over any kind of share. G I, the seed-box. H H, the handles of the machine.

The labour of using the instrument is very small. My workman usually accomplishes four statute acres or something more in a day: and last night, with the one I send, he sowed an acre and a half after six o'clock in the evening. There are two holes before the axis of the great wheel, to receive two pieces of cane, which point out the proper width of the intervals between the

rows.

rows. I usually place my rows at eighteen or twenty inches distance; and I wish my plants to stand at not more than six inches apart in the row; for I find that three small turnips weigh about as much as one large turnip, are more solid, and I think more nutricious, and certainly are much less apt to suffer by unfavourable weather. The ground between the rows is, of course, worked with the hoe. Should the Society, at their next meeting, approve of the instrument, and will afford it a place in their Repository, I will beg them to accept it; if not, I will request you to return it at your leisure.

I am, SIR,

Your most obedient servant,

THOMAS ANDREW KNIGHT.

Elton, near Ludlow,
June 22, 1800.

MR. CHARLES TAYLOR.

N. B.

N. B. The angle which forms the edge of the wheel A, must be made more or less acute; and the instrument more or less heavy, proportional to the strength of the soil. I have sometimes added weights of lead over the axis of the wheel, but it will rarely be found necessary. I have tried the instrument on different soils, and I think it will answer on any. A great advantage may be derived by sowing turnips with it, at a time when horses, now commonly used for the same purpose, are engaged in other employments. A few days are frequently of importance in sowing turnips, which by fortunate rains have got a wonderful start of those which have been sown a day or two later.

Fig. 3. is a section, on a larger scale, of the seed-box G, in *fig.* 2. The wheel, marked C, is also the same as in that figure: it is fixed upon the axis of the cylinder I, which is pierced upon the surface with holes at K, for the

the seed. This cylinder turns round within a groove at the bottom of the box, and is so well fitted therein, that no seed falls from the box but what is delivered by the holes K. A small brush, marked L, rubs against the cylinder, to clear out any seeds which may remain in the holes.

The seeds fall into the tube underneath the cylinder, and from thence into the channel, made by the indenting rim of the iron wheel.

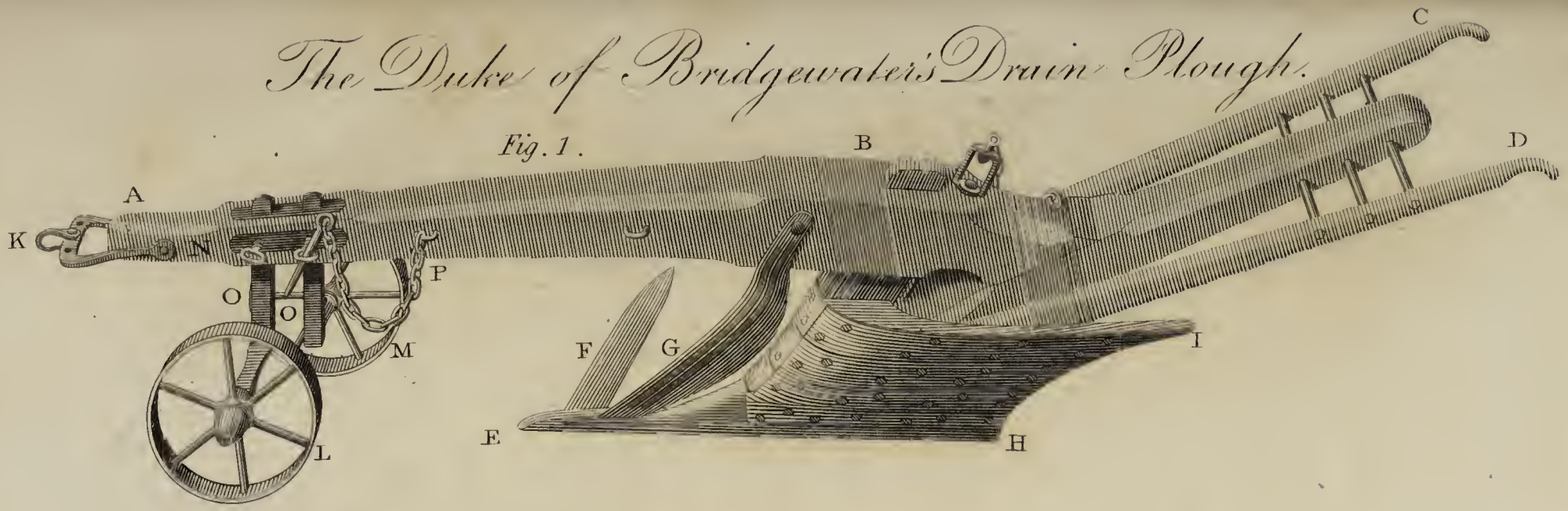
The loose chains which follow, cover the seeds with earth, as before mentioned.

Fig. 4. a front view of the wheel, exhibiting its edge.

The

The Duke of Bridgewater's Drain Plough.

Fig. 1.



Mr. T. A. Knight's Drill Machine.

Fig. 2.

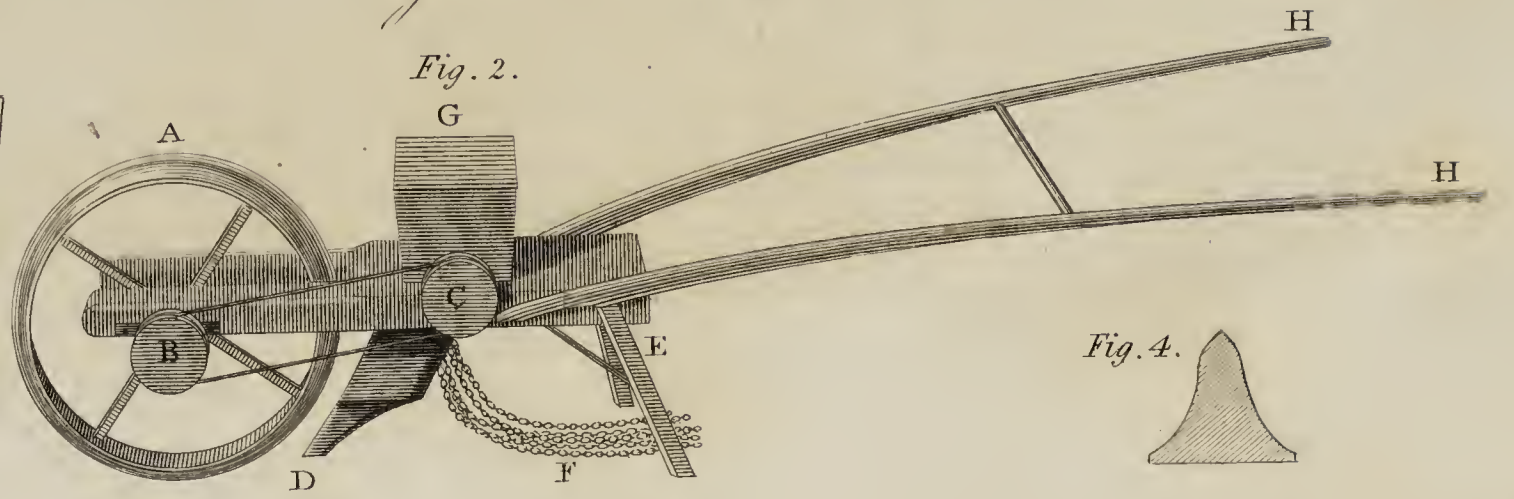


Fig. 3.

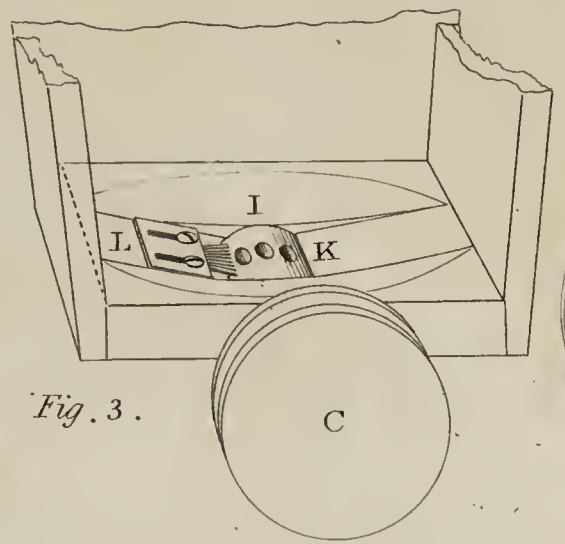


Fig. 4.

Lowry Sculp.

The Thanks of the Society were this Session voted to THOMAS ANDREW KNIGHT, Esq. of Elton, near Ludlow, for the following ingenious Communication on the destructive Effects of the APHIS, and BLIGHTS on FRUIT-TREES; with useful Observations for preventing them.

SIR,

SO many writers on gardening, and on general agriculture, have treated on Blights, and so many different theories have been offered to the Public, that the subject may appear to many, to have been already sufficiently investigated. The Society, however, entertained a contrary opinion; and having expressed a wish to receive further information, I avail myself of this opportunity to lay before them some remarks, which I have at different times made, during several

years of rather close attention to the subject.

What are usually termed Blights, in the vague and extensive signification of that word, appear to me to originate from three distinct causes:—From insects, from parasitical plants, and from unfavourable seasons.

The destructive effects of the Aphis on wall-trees are so well known to every gardener, as scarcely to require description. The leaves curl up, the fruit drops off, and the progress of vegetation is almost totally suspended. Much ill-applied labour is often used by the gardener to destroy these insects, though they are not very tenacious of life. Another more extensive, but less fatal disease in plants, the honey-dew, is produced by this insect (as described by the Abbé Boissier de Sauvages). It has, however, been contended, that the honey-dew is not produced by the Aphis, but that it is a morbid exudation from the plant;

plant; at least that there are two kinds of it; because the leaves are often covered with honey on trees where the Aphis is not found, and because the Aphis is sometimes found without the honey-dew. But to this it may be objected, that honey, not being a volatile substance, will remain on the leaves, till it be washed off by the rain; and, when moistened by the dew, will leave the appearance of a recent exudation; and that the Aphis certainly does not afford honey at any period of its existence. I have frequently placed plates of glass and of talc under the leaves of fruit-trees, on which different species of the Aphis abounded, and I have found these substances to be in a few hours covered with honey: and I have at other times distinctly seen the honey fall from the under-sides of the leaves, where these insects abounded, by the following means. Having placed a small branch, containing a numerous colony of insects,

in the window of my study, where the sun shone strongly upon it, I closed the shutters so as to exclude all the light, but that which fell directly on the branch. In this situation the descending drops of honey became extremely visible by refraction, and appeared evidently to be emitted from the insect with considerable force. Each drop contained many minute white points, which I considered as the eggs of the Aphis; but as I knew that the modes of generation in this singular insect had much engaged the attention of naturalists, I did not examine with sufficient attention to decide that point. This species of insect appears to require a previous disposition in the tree to receive it; and its first attacks may thence be considered as symptomatic of a previous ill habit in the tree: for I have found that trees which have lately been transplanted, have totally escaped its attacks, when every other tree of the same kind of

fruit,

fruit, growing in the same situation, has been nearly destroyed. And I can assert from many experiments, that if every peach and nectarine tree was to be dug up once in every five or six years, and to be replanted with some fresh mould round the roots (which should be as little injured as possible), a much larger quantity of fruit, and of very superior quality, would be obtained. It is unnecessary to inform the experienced gardener, that the tree should be removed early in the autumn; that its branches should be considerably retrenched, and that it should not be suffered to bear a heavy crop of fruit in the succeeding season. I have never found any species amongst the numerous and prolific genus of the Aphis, which was not readily destroyed on the wall-tree by covering it with a sheet of canvas, and under that introducing the smoke of tobacco. It is, however, necessary that the fumigation should be

repeated twice or thrice, with intervals of four or five days. I have often seen the addition of sulphur recommended, and have known it tried, but always with fatal consequences to the tree, as well as to the insects.

The blossoms of apple and pear-trees are often said by farmers to be blighted, when they are destroyed by insects, which breed within them, or in their fruit; and the same term is used, when the leaves have been eaten by the caterpillar: but as the insects themselves, as well as the manner in which their depredations are made, are extremely obvious, they do not properly come under our observation when treating of Blights.

The species of parasitical plants which are found in the form of disease on other plants, appear to me greatly to exceed the number of those I have any where seen described by botanical writers. Of these the mildew is the most common and obvious. If a branch, infected with

with this disease, be struck by the hand in calm dry weather, a quantity of white powder will be found to fly from it; and if this be received on a plate of talc, or of glass, and examined by the microscope, it will be found to consist of very numerous oval bodies, evidently organized. There is another plant similar to this in every thing but colour (being of a tawney brown), which is not unfrequently found on the leaves of young apple-trees. Both these plants appear to me to be evidently species of mucor; and as much the greater number of species of this genus of plants is found to flourish in damp air, and in situations deprived of light, it may be supposed that the foregoing diseases might be prevented or removed, by placing the plants at proper distances: but I have not found this to be the case. They, however, abound most in low and sheltered situations; but they are not unfrequently seen in those of an opposite kind. The red and white

mould on hops, and the black spots on stalks of wheat (the rubigo of Virgil), and many other diseases of plants, will, I think, be found to arise from the attacks of minute plants of this genus, which appears to me to possess qualities somewhat similar to the digestive powers of animals.

The most common and extensive causes of what are termed blights, remain still to be described, and evidently exist in the defects and sudden variations of our unsteady climate. Whatever be the cause by which the sap is raised and propelled to the extremities of trees, it is well known that its progress is accelerated by heat, and that it is checked, or totally suspended, by cold; and it has been ascertained by others, as well as by myself, and indeed is known to every experienced gardener, that a plant under the most skilful management, does not readily recover its former vigour, when it has been injured by exposure,

for

for a few hours, to a temperature much below that to which it has been previously accustomed. It frequently happens in this climate, when the blossoms of our fruit-trees are just expanding, that a very warm day succeeds a night whose temperature has been some degrees below the freezing point of water. In such a day the evaporation from the unfolding leaves and blossoms will be greatly increased by the agency of heat and light, whilst the supply of nourishment is in a great measure cut off by the ill effects of the preceding night. The blossoms will nevertheless unfold themselves, but will be unproductive, from the want of due nourishment; whilst the hazy appearance of the air, which almost always accompanies such weather in the spring, will induce the gardener unjustly to infer that the ill effects he observes have arisen from some quality in the air (distinct from excess of heat and cold), which he denominates a Blight.

The

The best defence against this kind of weather for wall-trees, that I believe has yet been tried, is a covering of a double and triple net; for by this the tree is in some degree protected from frost; and the excess of evaporation, in the succeeding day, is in a very considerable degree prevented. Lightning is supposed by many to be very highly injurious to the blossoms of trees; but I believe that the ill effects which appear sometimes to accompany it, may be more justly attributed to excessive heat. The careful gardener often covers his trees with mats, or something of this kind; and by almost totally depriving the tree of light, creates that blight which he is anxious to exclude.

As the blossoms of every tree are formed during the preceding summer and autumn, they will evidently be more perfect in proportion as those seasons have been favourable, and as the management of the gardener has been judicious:

dicious: and as the power of bearing unfavourable weather will be proportional to their vigour, and to the maturity of the annual wood, through which the sap passes to support them, the gardener should be (though he rarely is) extremely attentive to keep his trees in such a state, and the branches at such distances from each other, that they may receive the greatest possible benefit from the portion of light and heat which our shadowy climate affords them. It frequently happens in pruning, that too much bearing-wood is left on the tree. Every gardener ought to know, that where a hundred fruits are a sufficient crop for a tree, he has a better chance to obtain that hundred from one thousand blossoms, to which the whole nourishment of the tree is directed, than when the same quantity of nourishment has to support a hundred thousand.

In standard fruit-trees, where no advantages can be derived from covering them,

them, much may be done by the judicious application of the pruning-knife. The branches of a tree of this kind ought to be much thinned towards their extremities, so that the light may be admitted into the centre of the tree; but the internal parts of it should never be so thin as to admit of a free current of air through it. When a tree has been properly pruned, blossoms and fruit will be found on every part of it; and, in unfavourable seasons, the internal blossoms will receive protection from the external branches, which will be unfruitful.

It is particularly the interest of every planter, to take care that the varieties of fruit which he plants be sufficiently hardy for the situation in which he places them; for, if this be not attended to, little benefit will be derived from the foregoing observations. I could say much more on the subject; but, as my letter is already of considerable extent, I shall only add,

add, that if the Society should receive (as they probably will) a more satisfactory account of the cause of Blight, than will be found in the preceding letter, they may dispose of it as they think proper.

I am, SIR,

Your most obedient servant,

THOMAS ANDREW KNIGHT.

P. S. I do not send this paper as a claim for any premium, but to prevent attempts of imposition, from any pretender to the proposed reward.

Elton, near Ludlow,
November 4, 1800.

Mr. CHARLES TAYLOR.

The

The SILVER MEDAL was this Session presented to Mr. WILLIAM LESTER, of Northampton, for his Invention of an Implement in Husbandry, named by him a CULTIVATOR; from whom the following Account and Certificate were received, along with a Model, which is reserved in the Society's Repository.

SIR,

AS the health and luxuriance of Corn depend, in a great measure, on the pulverization of the soil previous to the seed being sown, the Society of Arts will, I am persuaded, give every encouragement in their power to the introduction of any implement that promises an abridgement of labour; and as all tenacious soils are pulverized in the best manner in dry weather, when their particles are the most disjointed,

and

and their contact broken, the propriety of taking the advantage of working them in that state will be obvious: and at the same time it follows, that an improved implement for the abridgement of labour would be a desirable thing, in a climate like England, where the seasons are so uncertain.

In working on a rough fallow, my Cultivator should be set at its greatest expansion, and contracted in proportion as the clods are reduced. I am confident that one man, a boy, and six horses, will move as much land in a day, and as effectually, as six ploughs; I mean land in a fallow state, that has been previously ploughed.

It will be requisite in some states of the soil to alter the breadth of the shares; but of this, I presume, the farmer will always be a proper judge. By the expansion and contraction of the Cultivator, the points of the shares are, in a small degree, moved out of the direct line;

line; but this is so trifling, that it is no impediment to its working.

I am, SIR,

Your most obedient servant,

WILLIAM LESTER.

Northampton,
February 10, 1801.

Mr. C. TAYLOR.

A Certificate from Mr. William Shaw, of Cotton-End, near Northampton, accompanied this letter; in which he states, that he had used Mr. Lester's Cultivator upon a turnip fallow last summer, and that he believes it to be a very useful implement for cultivating the land in a fallow state, by its working or scuffling off seven acres per day, with six horses. He adds, that, from its property of contracting and expanding, it is calculated to work the same land in a rough or fine state, by which mean it unites the principles

ciples of two implements in one; and by the index on the axis, it may be worked at any given depth required.

Description of Mr. Lester's Cultivator, Plate II. Fig. 1.

A. The beam.

B B. The handles.

C C. A cross-bar of a semicircular form, containing a number of holes, which allow the two bars D D, to be placed nearer or further from each other.

D D. Are two strong bars, moveable at one end, upon a pivot E, and extending from thence in a triangular form to the cross-bar C. In these bars are square holes, which allow the shares F, placed therein, to be fixed to any height required.

The seven shares marked F, are shaped at their lower extremities like small trowels: the upper parts of them are square iron bars.

G G G. Are three iron wheels, on which the machine is moved; they may be raised or lowered at pleasure.

H. The iron hook to which the swingle-tree and horses are to be fixed.

When the machine is first employed on the land, the bars D D are expanded as much as possible. As the soil is more loosened, they are brought nearer to the centre: the shares then occupy a less space, and the soil will consequently be better pulverized.

The

The GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS, at the option of the Candidate, being the Premium offered for the best Account of Experiments, to determine the comparative advantage of the Drill or Broad-cast Method in the Cultivation of TURNIPS, was this Session adjudged to the Rev. T. C. MUNNINGS, of East Dereham, in Norfolk, from whom the following Account and Certificates were received, and who made choice of the SILVER MEDAL and TEN GUINEAS.

A Plate and Description of the Drill-Machine, used in sowing the Turnip-Seed, is annexed, and the Machine is placed in the Repository of the Society.

SIR,

RESIDING in a country in which the Turnip-crop is very deservedly considered as the basis of its husbandry, I

have, for some time, directed my attention, and made some experiments, relative to the improvement of the cultivation of that valuable vegetable; conceiving that in whatever degree I could more advantageously produce Turnips, or, when produced, could provide for a more economical expenditure of the crop, I might fairly be regarded as in the same degree promoting the general and lasting interests of the community. With this view I have made repeated trials, to ascertain "*The comparative advantage of the Drill or Broad-cast method, in the Cultivation of Turnips*;" and as the result of an experiment which I made last year, has not only been satisfactory to myself, but also to all who have witnessed the effects of it, I am induced to offer myself a candidate for the Premium held out by the Society for the Encouragement of Arts, &c.

But, before I proceed to a detail of my experiments, I think it right to observe

serve that I have, *by way of preparation for Turnips*, given my land a *deeper* ploughing in the winter, than is customary with the neighbouring farmers. For this purpose I make use of a Scotch foot-plough; and I think that by *such* ploughing I bring land into action, which has been for some time *dormant*; and which is therefore better suited to the Turnip, than land which has been exhausted by the production of other crops. In every other respect my previous management of my land corresponds with the common practice of my neighbours.

My land *(a field of nine statute acres)*, being thus prepared, instead of sowing the Turnips *Broad-cast*, in the usual method, I invented a DRILL for this purpose, simple in its construction, and of easy management. It consists of a tin box, in the shape of a barrel, affixed to the axis of a wheel about twenty-two inches in diameter, vertical with the

same, and, in its revolutions, dropping the seed through small apertures in the middle of the barrel. The holes through which the seed falls, are distant from the wheel about fourteen inches. *(See the engraving and description thereof annexed).*

I began by having the tops of the different ridges set out with the common Norfolk *two-horse plough*: and, when the same plough took up the furrow next to the top, I immediately followed with my Drill, and dropped the seeds upon the fresh mould the instant it was turned up. I was then followed by a one-horse plough, the over-shot mould of which as quickly buried the seeds. I was thus enabled to sow my seeds as fast as the land was ploughed, and to deposit them in regular and strait rows, at equal distances of about eighteen inches; after which I harrowed or rolled my land, in the same direction in which it was ploughed: and the consequence has been

that

that my crop has grown as regularly as a gardener could plant cabbages. Nearly six acres of my field were thus drilled, and on the same day (in the third week of June) the remainder of the field, or something more than three acres, was sown Broad-cast, after the usual practice of the country, and precisely at the same time when the farmers around me were sowing their lands in a similar manner.

In the course of my observations on the Turnip-crop, I had frequently lamented, that when the crop was indeed abundant, the advantages derived from its expenditure were far from correspondent; because no effectual method has yet been adopted, to protect the Turnips from the severity of a winter's frost. This, in the common method of *Broad-cast* sowing, I considered as impracticable, and therefore resolved to attempt it in my drilled crop; and, in that crop, I have been enabled, by

pulling up the alternate rows, to leave regular rows about a yard apart; and have had the land so ploughed, with a one-horse plough, as to mould up the Turnips, on each side, most effectually, and to assume the appearance of what is called *two-furrow work*. I have therefore half my crop so buried, as to lessen very materially, if not absolutely to prevent the danger arising from the frequently fatal effects of a cutting frost.

I am truly happy that the mildness of the present season prevents my speaking with greater confidence, as to the success of this part of my experiment, though the very complete manner in which the Turnips are now buried, leaves me without much doubt but that it will fully answer my expectations. Many very experienced farmers, who have witnessed my proceedings, honour them with their entire approbation, and look upon my method of protecting my

plants

plants as a grand discovery, in the management of the Turnip-crop. I am certainly aware that I am not the first person who has drilled Turnips; but I know of no one who has before done it in so simple a manner—in a manner attended with less expence—in a manner admitting of so much ease, in future operations for the defence of the plants—or in a manner more likely to be clearly understood by all who may be desirous of making similar experiments. Of the superior produce of the drilled crop over the broad-cast, on equal quantities of land, every experiment that I have made has most powerfully convinced me; and I have the universal opinion of all who have viewed my present crop, to confirm my sentiments. It has been observed by Mr. Kent, in his General View of the Agriculture of the County of Norfolk, that the ground does not relish Turnips so well as formerly: and

be

he supposes (in my opinion with much justice) that the present comparative ignorance of the use of Turnips amongst the Hanoverians, has arisen from the ground in that country being injured by repeated crops of them. It is certainly a very obvious truth, that Turnips will grow in the greatest abundance on land not accustomed to bear them: but it has frequently occurred to me, that one material reason of failure in a crop of Turnips sown broad-cast, has arisen from the seed not being sown soon enough after the plough; as I have, in numberless instances, taken notice of Turnips vegetating very partially, when only a few furrows have been ploughed between one sowing and another: and, in such cases, I have always thought that, if the seed could have been deposited immediately after the plough, it would not have failed to grow uniformly. I trust it will be found that my experiment

ment powerfully tends to confirm this conclusion.

Of the following advantages, attending my method of drilling Turnips, I am satisfactorily persuaded:—In a dry time, as was the case last season, the seed, by being immediately dropped upon the fresh turned-up mould, has consequently an increased probability of successful vegetation. By being buried somewhat deeper than in the broad-cast method, it receives more moisture in its infant state of vegetation; and by having, if I may so say, new hold of the earth, is less liable to injury, from the effects of continued drought. In confirmation of these persuasions I must state, that Turnips sown on the same day, in the same field, broad-cast, on land in every other respect treated previously in the same way, have not produced one half or one third of a crop, and that the same has been very generally the case with Turnips sown broad-

cast;

cast; but that every row of my drilled plants has succeeded to admiration. The advantages in the subsequent management of the crop, I have already spoken of. If therefore it be desirable to grow Turnips to advantage; if it be desirable to protect them when grown, and by such protection be enabled to give Stock, sound, uninjured Turnips, instead of what may be more than half-rotten, or frost-nipt almost to putrefaction; I would willingly flatter myself that the Society for the Encouragement of Arts will be convinced that, as far as any conclusion can be drawn from a single experiment in favour of one method rather than another, I have, beyond dispute, established the superiority of the Drill method of cultivating Turnips. And as, in addition thereto, I have in part effected what seems to me the object of the Society, in the latter part of the *Nota bene* subjoined to Premium 95, the preservation of Turnips upon the ground

ground when grown, I am induced to hope that the Society will think me entitled to the Premium for which I am a candidate.

Of my previous experiments I am not able to furnish the Society with any satisfactory particulars; yet I would by no means omit to declare, that each has been the mean of persuading me, that the Broad-cast method of cultivating Turnips can never be so advantageous as that of the Drill, when properly managed; and I have much satisfaction in assuring the Society, that, from the extraordinary success of my last year's experiment, many of my neighbours have expressed a resolution to drill, and to protect their Turnips for the time to come. Any other particulars into which the Society may be inclined to enquire, will be answered with readiness and pleasure by, SIR,

Your obedient servant,

T. C. MUNNINGS.

P. S. I beg leave to observe, in addition to the advantages I have before stated, that my drilled plants growing in such very strait and equidistant rows, any noxious weeds, such as *charlock*, *thistles*, or *red-weed*, may be destroyed in the infant state of the plants, by hoeing the intermediate spaces; that when the alternate rows are removed, and the land ploughed for the defence of the remaining rows, it receives most of the benefits of a winter's frost, and is very much forwarded in preparation for the barley-crop; and that, above all, from my complete success, I have roused a spirit of emulation in the cultivation of turnips, among the farmers of the county of Norfolk.

With regard to my Turnips it would be easy to multiply Certificates, and be diffuse in my observations, because no agriculturist has viewed them without being surprised both at the abundance of the crop (considering the quality of the

my land), and at the very obvious simplicity of my management of it, from beginning to end. I shall only farther observe, that it is now in my power to sow my seed at equal distances of nine, eighteen, twenty-seven, thirty-six inches, or at any given distance of inches, of which nine are an aliquot part; and that I consider this as no trifling convenience.

I am, SIR,

Your obedient servant,

T. C. MUNNINGS.

East Dereham, Norfolk,
March 12, 1801.

MR. CHARLES TAYLOR.

SIR,

SINCE I wrote to you on the subject of my drilled Turnips, I have been powerfully struck with some advantages of the drill method, which I now beg permission to state to you.

In

In a part of my field from which the alternate rows have not yet been taken, I have, with very great effect, used the hoe-plough, and have not only cut and destroyed whatever weeds were growing between the rows, but have also partially moulded up the apples of the Turnips; and I am induced to believe that even so partial a moulding up, executed in the autumnal months, would have a strong tendency to protect the plants, to facilitate a more complete moulding-up when part of the crop is removed, and to admit the full benefit resulting from the exposure of the earth to a winter's frost. I am persuaded that such use of the hoe-plough serves likewise to retain necessary moisture, and to produce future pulverization with much less than common labour. But I have more particularly noticed the very superior verdure of the moulded-up plants, compared with what are not so, and with the larger and almost uninjured

tops

tops of the former, in comparison with the latter; for, during some late frosts, the effects of which were very perceptible in the exposed plants, those moulded up have continued to grow, and to branch luxuriantly, with all the vigour of vernal vegetation. I attribute this to the bulbs of such plants not having their juices stagnated by the keenness of the weather.

As I am anxious to have this subject fully submitted to the Society for the Encouragement of Arts, &c. allow me to say, that I consider my Drill for Turnips as much superior to any other, from the single circumstance of its depositing the seed so *instantly* after the plough, as entirely to preserve the good effects of the first evaporation; and that I conceive such evaporation produces the uniform vegetation of such minute seeds. So remarkably uniform was the vegetation last year, that in the six acres of my drilled plants, I believe there was

not a deficiency of six square yards; though on three acres of broad-cast, before rain fell, not one half, perhaps not one third part of the seeds vegetated. I am indeed fully persuaded that the Drill method, in the cultivation of Turnips, will in all seasons be superior to the Broad-cast; but that the very great and striking difference between the two methods will most effectually be perceived in a season of uncommon drought; and it is for this reason that I am solicitous to procure for the Drill method an extensive and impartial trial, that agriculturists in general may be satifactorily convinced of its important advantages.

I am, SIR,

Your obedient servant,

T. C. MUNNINGS.

March 14, 1801.

MR. CHARLES TAYLOR.

Certificates

Certificates accompanied these letters, from Mr. James Blomfield, of Billingford; Mr. St. John Priest, Master of Scarning School; Mr. William Salter, and Mr. Daniel Reeve, of Beetley; John Tuck, and the Rev. George Preston, Curate of East Dereham; all which confirm the above accounts.

Description of Mr. T. C. Munnings's Drill Machine. Plate II. Fig. 2.

A. The wheel with an iron rim.

B. The tin barrel, or seed-box, fixed to the axis of the above wheel.

C. The aperture by which the seed is introduced into the box:—this aperture is afterwards closed by a cover.

D. A semicircular plate of tin, to prevent any dirt falling upon the seed-box.

E E. The two handles of the machine.

Plate II. Fig. 3.

F. Represents the seed-box on a larger scale.

G. The holes in the tin box, through which the seed falls upon the land.

H. Part of the axis of the wheel, to which the seed-box is fixed.

The

The Thanks of the Society were this Session voted to THOMAS ECCLESTON, Esq. of Scaresbrick-Hall, in Lancashire, for his Invention of an AUGRE, or PEAT-BORER, for draining Boggy Land. A Model of this Implement was presented by him to the Society, along with the following Communication, and is placed in their Repository.

SIR,

THE greatest obstacle to the effectual draining of many boggy lands, consists in the earth in the bottoms of the ditches or drains when newly cut, and more especially if made to any considerable depth, rising from the pressure of the waters contained in the bog, by which the new-cut drains and ditches are frequently so nearly filled up, as to impede the flowing of the water they were

intended to carry off, and thereby rendering the work comparatively ineffectual.

There are different layers, or strata, in moss or peat lands, which will not allow the water easily to filtrate through them, yet are of so soft and spongy a nature as to rise from the pressure of the water contained in the bog.

It becomes necessary to give a free vent to the above confined water, effectually to drain such lands. This has been most successfully done by the Augre, a model of which I have herewith presented to the Society.

A common augre, or even a pole, will force a passage, and give vent to the water for a short time; but owing to the peat being only pressed sideways, and not cut out, the parts soon join again, and the passage of the water of course becomes completely obstructed; but by means of this Augre, a cylindrical column of peat of six inches diameter will be

be clearly cut out and taken thence, and a free passage maintained for a very considerable space of time.

The first experiment made, produced a clear augre-hole of the above dimensions, four yards in depth, in one hour; and the water, which had been pent up in the bog, rose above the level of the bottom of the ditch, from four to six inches; and the bottom of the ditch, which was previously very soft, and had begun to swell and rise, in a few days became more firm and solid, and this in so great a degree, that when cleared it remained without swelling or rising in the least. It will considerably reduce the expense of draining such lands, by rendering them so firm as to cause the first end-drains to stand.

The most proper depth to bore, depends on the situation. Where the moss lands lie low, and are in danger of being flooded, no greater depth than what is absolutely necessary for draining the

surface should be bored, as, by deep boring, the land may be sunk so low as to be liable to inundation.

I am, SIR,

Your most obedient servant,

THOMAS ECCLESTON.

Scaresbrick, Lancashire,
May 25, 1801.

MR. CHARLES TAYLOR.

Description of Mr. Eccleston's Peat-Borer. Plate II. Fig. 4.

A. The cutter of the borer, which penetrates the peat.

B. The body of the borer, six inches in diameter.

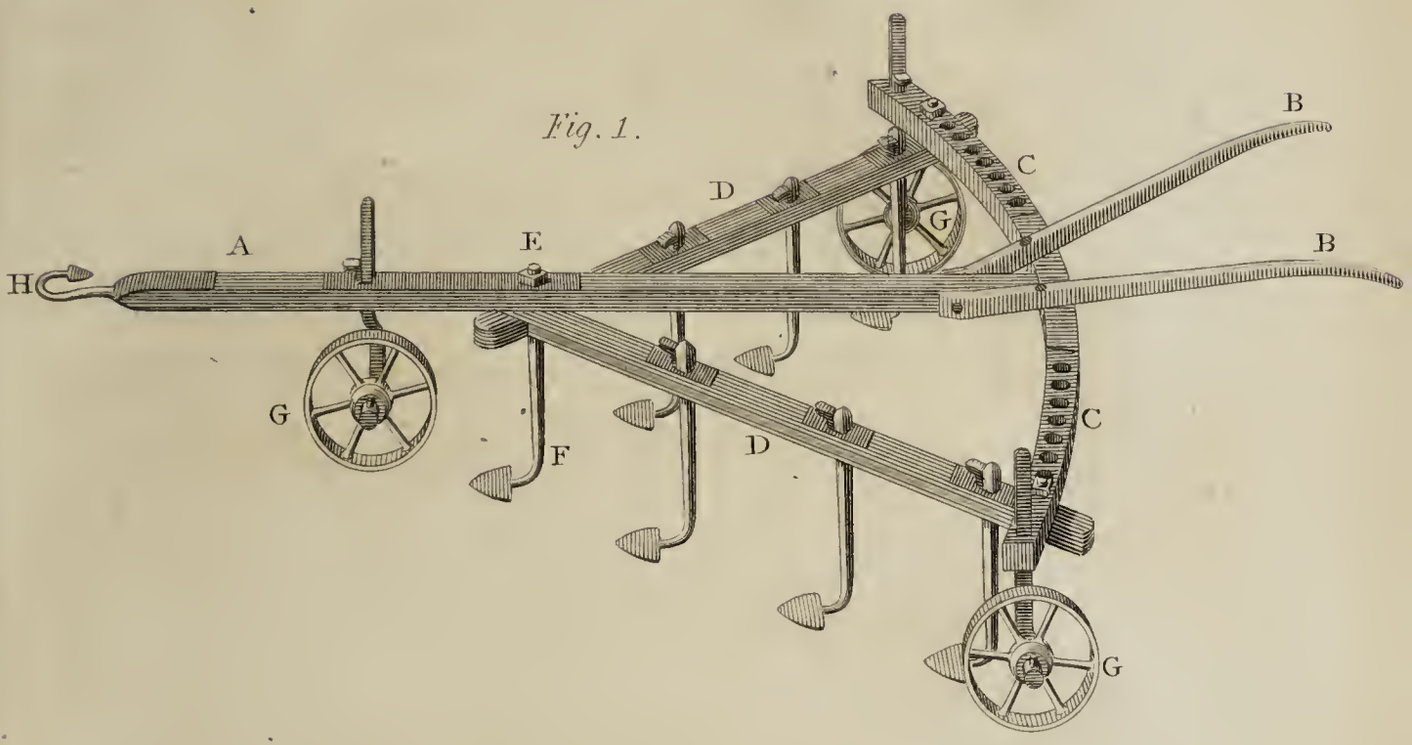
C. The aperture through which the peat introduced by boring is drawn out.

D. A portion of the iron bar of the borer, to the upper part of which a cross handle is to be fixed.

The

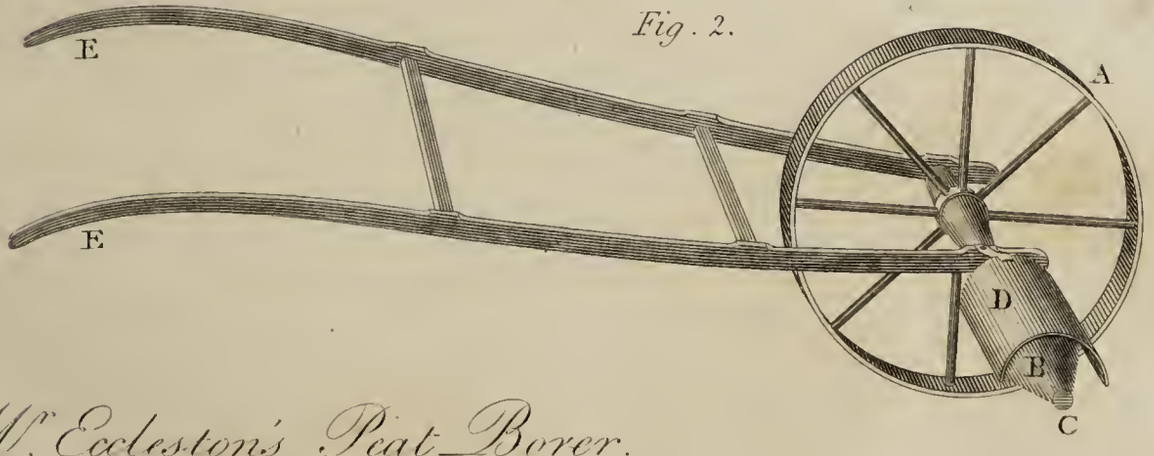
Mr. Lester's Cultivator.

Fig. 1.



Mr. T. C. Munning's Drill Machine.

Fig. 2.



Mr. Eccleston's Peat Borer.

Fig. 4.

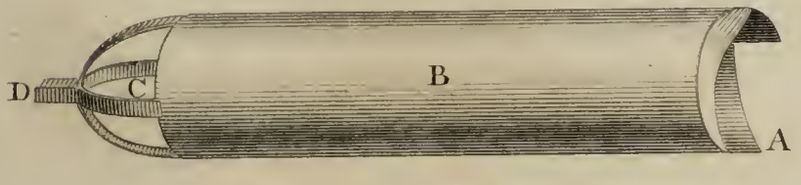
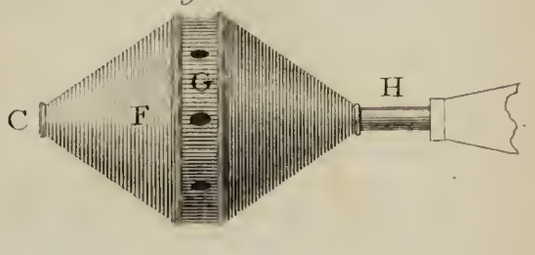


Fig. 3.



Lowry Sculp.

The GOLD MEDAL was this Session adjudged to NICHOLAS ASHTON, Esq. of Woolton-Hall, near Liverpool, for planting ONE HUNDRED and THIRTY-THREE ACRES of WASTE MOOR LAND. The following Account and Certificates were received from him.

SIR,

THE Forest of Delamere, in the county of Chester, is of great extent; and from old records appears to have produced much valuable timber, which is nearly all destroyed; and the land, which is now productive of little more than heath, affords but a scanty provision for a few sheep and rabbits.

The soil is in most parts extremely thin; and under it is a great depth of sand, intermixed with gravel.

From the timber it has produced, I was naturally led to expect, with care

and

and proper management, trees might be again raised, which may prove beneficial not only to the planter, but, if executed on a great scale, to the kingdom at large; and having waste land adjoining to the forest, of the same quality, I determined, in the summer of the year 1795, to try the experiment. Accordingly, for that purpose, I enclosed one hundred and thirty-three acres of land in two lots, and surrounded them with posts and double-railing. I engaged Messrs. Dickson and Sons, nurserymen, to plant the same with forest-trees; which they completed the winter following, very much to my satisfaction, agreeably to the Certificate sent herewith, to which I beg leave to refer. It may be proper to add, that the plantation was surrounded with a ditch and copse, and the latter planted, below the railing, with white thorns. To make the guard still more effectual, about four feet from the railing, within the inclosures, I directed a

line

line of French gorse to be sowed in a drill; and having built a lodge upon the premises for one of my labourers, I ordered him to devote his whole time and attention to preserve the fences, and protect the trees from injury by sheep, or otherwise. This, I have the pleasure to say, he has diligently performed; and there is every appearance of the plantation succeeding according to my wishes.

From the very thin layer of vegetable soil, Messrs. Dickson's were of opinion that it would be best not to plough the land; but after burning the heath, at the close of the summer, to plant the trees that were small near the surface, expecting they would flourish more than if planted in the sand. This, however, proved not to be the case; for the matted roots of the heath were the first year detrimental to the young plants; whereas those which were planted on sand beds, from which the gravel had been

been screened, took root immediately, and are easily perceived from the rest of the plantation.

If this experimental proof of success in planting timber-trees on very barren soils, should be an inducement to the public, or individuals, to pursue the same upon a large scale, it will give me very particular pleasure, and, I trust, be of great national advantage.

I am, SIR,

Your most obedient servant,

NICHOLAS ASHTON.

N. B. I beg leave to add, that the flourishing state of my plantations has induced other gentlemen, in the county of Chester, to plant upon similar soils.

Woolton-Hall,
October 13, 1800.

THIS

THIS is to certify that Archibald Dickson and Sons, nurserymen, of Hassendeanburn, near Haurick, Roxburgshire, Scotland, by directions from Nicholas Ashton, Esq. planted, during the months of November and December, 1795, four hundred and eighty-seven thousand and forty forest-trees, viz.

Scots Firs - - -	242,600
Larches - - -	181,200
Ashes - - -	4,800
Oak - - - -	16,200
Sycamore - - -	15,000
Elm - - - -	7,200
Beech - - -	18,060
Tree Willow - -	1,200
Alder - - -	600
Laburnum - -	60
Weeping Birch - -	60
Mountain Ash - -	30
Spanish Chesnuts -	30
Total	487,040

And

And the said trees were planted upon one hundred and thirty-three acres of Waste Land, in the township of Weaverham, and adjoining to the Forest of Delamere, in the county of Chester.—And I ARCHIBALD DICKSON do further certify, that I have this day, together with the Rev. John WILLAN, of Weaverham, and Mr. GEORGE OKELL, steward for Nicholas Ashton, Esq. visited and carefully examined the said plantation, and find the trees in a promising and flourishing condition; and to the best of our judgment we conceive, that not more than one twelfth part of the whole has perished.

ARCHIBALD DICKSON.
GEORGE OKELL.
JAMES WILLAN.

The

The Thanks of the Society were this Session voted to EDWARD JONES, Esq. of Wepre-Hall, in Flintshire, for the following Communication, on the Destruction of the GRUB of the COCKCHAFER.

SIR,

THE Society having directed their attention to the preservation of herbage from noxious insects, and among others the Cockchafer, by destroying its Grub; I beg leave to submit a few observations on the subject for their consideration.

The Grubs of the Cockchafers (or brown beetles) are white, about an inch in length, and of the thickness of a turkey's quill. When disturbed they contract their length, and their bodies dilating, appear like lumps of white fat,* somewhat oval.

They

* Hence the British name "Earth-Lard."

They inhabit sandy and light loamy soils, lie from about two to six inches deep, and may be found in spring, by paring off the sods.

This place was much infested by brown beetles; but about twelve years ago, some labourers removing a bank of earth, exposed a bed of Grubs, several paces in length. Many of them were scattered among the fallen soil; and one of the men proposed to strip the surface of the bank, which being done, the Grubs were seen lying in irriguous channels, as if the parent insects had dropped the eggs moving in various directions.

The same man informed me that they were the favourite food of moles; and he desired me to observe an end of the bank not stripped (being covered with mole hills); "for there no beetle grubs would be found." When opened, his remark proved true:—the moles had traced all the labyrinths of the grubs.

My

I took the hint for the preservation of my foliage, and have ever since protected the race of moles. The brown beetles gradually decreased, and are now rarely seen here. I have not observed more than one or two stragglers in the two last springs.

Some notice of the habits of moles may be acceptable to the Society, as it has been said "that they penetrate deep into the earth, in dry weather; rarely quit their subterraneous dwellings, and have few enemies;"—and "that they do great mischief in gardens and corn-grounds."

I have always found that in hay and pasture grounds, as soon as the grass is high enough to cover them, they run upon the surface, where they find their food in the numerous caterpillars and insects which in the early part of the summer crawl out of the earth; and they continue above ground till the har-

vest. They are frequently cut by the scythe; and I have seen them at various times come out of deep hay grass into places recently mown, and, perceiving their exposure, endeavour to conceal themselves in the shorn grass.

I have also often seen moles on very close mown grass, and bare spots in pasture land, plunge, when alarmed, among the roots; following their path (which was discernible by the heaving of the surface), I have forced them out occasionally, to try the depth of the covering, which was only a few shreds of roots.

There are two circumstances that may oblige moles sometimes to penetrate deeply:—disturbed soils in summer, such as in gardens; and ploughed light lands, where the moles delve in pursuit of worms; and, in their course, they must unroot and destroy some plants; but a vigilant gardener and husbandman will prevent much damage.

The

The other cause of their digging deep is frost, which they avoid, or it would kill them. I have found them in winter, in peat soil, two and three feet below the surface; and in the hard frost of 1794-5 (cutting deep trenches to separate grounds), I found moles several mornings, that had worked through and fallen into the trenches, frozen to death.

Their summer emersion is proved by the birds of prey: they destroy great numbers of moles. This year there were taken out of one kite's nest twenty-two moles, and out of another fifteen, some of which were putrid; besides many frogs and unfledged birds.

The rapacity of the kites shews that they are destructive enemies to the moles, which, if moles are serviceable to man, should be known, that he may stay his arm.

Moles are frequently found dead upon the grass in summer, with marks of

having been bitten, as if to suck their blood, but with no part of their bodies consumed. This, I suppose, is done by weasels; and the following (not very common) occurrence, which happened in the summer of 1789, tends to prove it:—

A kite was observed rising from the ground with some prey, and instead of flying to an adjoining wood, he soared almost perpendicularly. After remaining a short time stationary, he came gradually down, with his wings extended and motionless, and dropt very near the place from which he had risen *.

Several persons who were near, and saw the flight and descent, ran immediately to the spot, and a weasel darted from the kite, which they found dead; and they discovered, on examination, that the kite had been bit in the throat, and

* A similar circumstance was mentioned in the Chester papers, three or four years ago.

and bled to death. Near it they found a dead mole, yet warm, which was bitten in the neck; and they concluded that the weasel had caused the death of both.

In several parts of the kingdom where I have met with a great number of brown beetles, moles were regularly destroyed; and in Staffordshire, being shown several large trees covered by beetles, and totally defoliated, I enquired whether they destroyed the moles? The answer was, that they did, or they should be overrun with them.

The loss of foliage not being of great consequence to the farmer, he is satisfied that his turkeys make him amends in other respects, by eating the brown beetles, of which they are very fond, and which they swallow voraciously.

A gentleman informed me lately, that rooks also eat the beetles.

But these means are confined to the winged beetle. It appears to me that

the mole is the only certain destroyer of the grub.

My hay and pasture grounds are, every spring, thickly studded with mole hillocks. They are scattered in the usual manner; and when the grasses are up, the moles cease to work, and scarce a hillock appears till after harvest.

I remain, SIR,

Your most obedient servant,

EDWARD JONES.

Wepre-Hall,
December 24, 1799.

Mr. CHARLES TAYLOR.

The

The SILVER MEDAL was this Session presented to Mr. JOHN HORRIDGE, of Raikes, near Bolton in the Moors, Lancashire, for the following Communication on the Preparation and Application of COMPOSTS for MANURE.

SIR,

PERMIT me to request you to lay before the Society for the Encouragement of Arts, &c. the following memorial of the improvements and experiments which I have made in a quantity of land.

In the first place, I must solicit your attention to a new and cheap method of planting potatoes, and which I never knew to be attempted by any one but myself. The following is the manner in which I tried the experiment:—A quantity of land in my farm wanted draining,

and I had occasion for a large main-drain for that purpose; in the cutting thereof I found a quantity of earth, in a solid bed, resembling peat, but of a more solid substance than peat generally is. I threw it into heaps, and, after the ochery water had left it, mixed it with lime, which appeared to me to form with it an excellent manure. After this, I fallowed a field of a gravelly soil, drilled it for potatoes, and put the same quantity of this Compost into the drills, as I should otherwise have done of black dung; and the produce from eight statute acres was 864 loads, of thirteen score to the load. I then ploughed it for wheat, and had a most excellent crop; sowed it with white clover and grass seeds, and let it lie for grass: it has been, and is now, one of the best pastures in the neighbourhood. The land, before the improvement, was worth about £1. 10s. an acre, and, after taking two very great crops from it, is now worth

worth about £3. per acre. The general opinion of the country was against the use of lime, in the setting of potatoes: it has, however, answered beyond expectation; and had I been under the necessity of procuring dung for my potatoes, instead of this Compost, it would have cost me six times as much money.

Having made the above experiment with potatoes and wheat, I was inclined to try the same sort of Compost upon grass-lands. In a little valley between two small hills in my farm, I found a very large bed of peat, composed of decayed vegetable substances, which was boggy, and in some places upwards of nine feet in depth. This I drained and drew off the stagnant water with which it was filled: it appeared to me the whole bed, in consequence of being laid dry, had fermented; for when we afterwards cut it, we found it converted to very fine mould. I caused it to be

trenched

trenched to the next stratum, which was marl, and mixed it with lime hot from the kiln; but very soon found that I must slack the lime before mixing, or it would have burnt it to ashes, by undergoing a fresh degree of fermentation. The quantity I mixed was nine thousand tons, with 1327 horse-loads of lime, which cost me about £160, and I gave one penny per cubic yard for the trenching and mixing: and having about thirty acres of gravelly soil, I begun in October to cover my land with this Compost, which, in a very short time, proved advantageous; for the grass began to spring as if it had been April, and soon produced a very luxuriant pasture of about four acres in extent. This I covered first, and turned into it eight milch cows, about the 15th of December. They fed thereon till the 1st of March, and gave me a very great quantity of milk and butter; and the butter was rich and yellow, like spring butter. The cows, while

while in this pasture, had very little hay, and that during the night, of which they would eat only a very few pounds. Since I took out my cows, I have pastured the land with twenty in-lamb ewes, of the large white-faced or Malham breed.—They are now pasturing; and I doubt not but it would feed sheep very fat. I have now covered about twenty-six acres more, which promise to be as successful as the other, and amounting to, in the whole, thirty acres. This, prior to the improvements, was worth £2 : 10s. per acre, and is now worth £4 per acre.

This Compost is, I believe, equal to the best manure I could obtain, and the advantage arising from peat compost with lime, when laid upon gravel, sandy, or clay soils, is almost invaluable. The quantity of this Compost which I have now ready prepared, together with what I have used, amounts to nine thousand tons, which has been raised since last summer;

summer; and the total expense is £530. The quantity per acre is one hundred and forty tons, which cost me about £8 per acre. Had it been dunged the common way, it would have cost me sixteen guineas per acre, and would not have answered so well. The remainder of my Compost is upwards of four thousand tons; I have thirty acres more to cover, the greatest quantity of which I intend to plant with potatoes. By the statement above, you will see the annual value of the land at present, and what its value was prior to those improvements.

I remain, SIR,

Yours respectfully,

JOHN HORRIDGE.

Raikes, near Bolton le Moors, Lancashire.

Mr. CHARLES TAYLOR.

Certified the 11th of March, 1801, by

THOMAS BANCROFT, Vicar of Bolton.

RA. FLETCHER. PETER SMITH.

PAPERS

IN

CHEMISTRY.

CHEMISTRY.

The GOLD MEDAL, being the Premium offered for preserving FRESH WATER SWEET during long Voyages, was this Session adjudged to SAMUEL BENTHAM, Esq. of Queen's Square, Westminster, from whom the following Account and Certificates were received.

SIR,

THE Society for the Encouragement of Arts, &c. having thought proper to offer a premium in order to ascertain, for the use of the public, the best mode of preserving Fresh Water sweet at Sea, I request you to lay before the Society an account of the method which I have employed for this purpose on board two ships, and which has been attended

attended with all the success that can be reasonably expected.

The mode in which I conceived Fresh Water might be preserved sweet, was merely by keeping it in vessels of which the interior lining at least should be of such a substance as should not be acted upon by the water, so as to become a cause of contamination. Accordingly, on board the two ships here alluded to, the greater part of the water was kept, not in casks, but in cases or tanks, which, though they were made of wood, on account of strength, were lined with metallic plates, of the kind manufactured by Mr. Charles Wyatt of Bridge-street, under the denomination of tinned copper-sheets; and the junctures of the plates or sheets were soldered together, so that the tightness of the cases depended entirely on the lining, the water having no where access to the wood. The shape of these cases was adapted to that of the hold of the ship, some of them

them being made to fit close under the platform, by which means the quantity of water stowed was considerably greater than could have been stowed, in the same space, by means of casks; and thereby the stowage room on board ship was very much increased.

The quantity of water kept in this manner on board each ship, was about forty tons divided into sixteen tanks; and there was likewise, on board each of the ships, about thirty tons stowed in casks as usual.

As the stowing the water in tanks was considered as an experiment, the water in the casks was used in preference; that in the tanks being reserved for occasions of necessity, excepting that a small quantity of it was used occasionally for the purpose of ascertaining its purity, or when the water in the casks was deemed, when compared with that in tanks, too bad for use.

The water in thirteen of the tanks, on board one ship, and in all the tanks on board the other, was always as sweet as when first taken from the source; but in the other three of the tanks, on board one ship, the water was found to be more or less tainted as in the casks. This difference, however, is easily accounted for, by supposing that the water of these tanks was contaminated before it was put into them; for in fact the whole of the water was brought on board in casks, for the purpose of filling the tanks, and no particular care was taken, to taste the water at the time of taking it on board.

After the water kept in this manner had remained on board a length of time which was deemed sufficient for experiment, it was used out, and the tanks were replenished as occasion required: but in some of the tanks, on board one ship at least, the original water had remained

mained three years and a half, as appears by the certificates herewith inclosed. About twenty-five gallons of the water, which had remained this length of time in the ship, are sent to the Society, in two vessels made of the same sort of tinned copper with which the tanks were lined.

I am, SIR,

Your obedient servant,

SAMUEL BENTHAM.

A certificate from Captain William Bolton, commander of the said vessel, dated Sheerness, 28th of June, 1800, accompanied this letter, stating that the water delivered to the Society was taken from a tank holding about seven hundred gallons, and which his predecessor Captain Portlock had informed him had been poured into this tank in De-

cember 1796, except about thirty gallons added in 1798, and had remained good during the whole time.

The signatures to the above accounts were certified on the 28th of June, 1800, by the

Rev. C. Thee, Minister of Sheerness.

In a letter dated January 27, General Bentham also states, that the water which had been preserved sweet on board his Majesty's sloops Arrow and Dart, and of which he had sent specimens to the Society, was taken from the well at the King's brewhouse at Weevil, from whence ships of war lying at or near Portsmouth are usually supplied with water for their sea store, as well as for present use.

The

The Thanks of the Society were this Session voted to the Rev. EDMUND CARTWRIGHT, of Mary-le-Bone, for the following Communication upon the Production of OPIUM from Lettuces.

SIR,

HAVING lately made a discovery which I have reason to think may in the event lead to consequences of importance, whether considered as an object of science connected with the medical art, or of political economy in influencing an article of commerce, I feel it incumbent upon me to lay it before a Society with whose views it coincides, and to which, from a variety of personal motives, I am zealously attached.

Happening, some time in the month of August last, to read an account of the

process for obtaining Opium from Poppies, I was led to consider the very peculiar nature of the substance which constitutes that most powerful drug.

On turning over the subject in my mind, the different varieties of the lactiferous plants naturally presented themselves to my recollection. From the uniformity which nature invariably observes in her operations, it seemed reasonable to conclude that the milky juice would, in regard to its prevailing property, be alike in all the different kinds of plants from which it is to be obtained; though perhaps more or less narcotic, and probably more or less deleterious, according to the specific quality of the particular plant which might yield it.

There being at that time in my garden a bed of lettuces running to seed (in which state they are known to be more particularly lactiferous), I collected a small quantity of the milky juice; and in a day or two, when it was sufficiently

inspis-

inspissated to admit of taking a solid form, I carried it, amounting to about six grains, to my friend Dr. George Pearson, requesting he would bring its properties, in any way he thought most satisfactory, to the test of experiment. The Doctor has since favoured me with the following letter on the subject.

DEAR SIR,

ACCORDING to your request, I have the pleasure of sending you an account of the effects of the dried milky juice of Lettuce-stalks, in the instance which fell under my observation. This instance was John Sheppy, aged nineteen years, who had been ill with what is called chronic rheumatism about two months, so as to be confined to his chair and bed. He had regularly slept every night from about nine to twelve o'clock; but at two o'clock had been uniformly awaked by considerable pains of his

limbs, especially of the elbows, and passed the remainder of the night in a sleepless state.

The sufferer had taken, for several nights preceding the exhibition of the dried Lettuce juice, a scruple in weight of Dover's powder without any relief; and, in place of this medicine, I administered the six grains of dried Lettuce juice at nine o'clock. The consequence was, that in twenty minutes he fell asleep, and slept all night soundly till four in the morning, and a great part of the day following. The next night he also had but slight pain, till the third night, when as usual the paroxysm of suffering returned at midnight. The day after the taking this medicine, the patient was affected with head-ache, and felt a little numbness. He had three evacuations by stool the day following.

On the fourth night after the Lettuce juice had been given, he swallowed one

grain

grain of solid Opium, but without any subsequent relief.

On the fifth night *three* grains of solid Opium were given, but still he had a recurrence of pain at night, and passed a restless night, although not so bad as usual; nor by a repetition of opium could the case be effectually relieved. But it was at last cured by frictions with mercurial ointment.

The preceding trial, I apprehend, shews, as decidedly as a single case can do, that the efficacy of dried Lettuce juice, as an *anodyne*, is at least equal to the dried poppy juice, commonly called Opium, if given in adequate doses.

Yours, &c.

G. Pearson.

If it should be found on subsequent trials, that the milky juice of Lettuce possesses, as possibly it may do, all the valuable properties of the common Opium, Lettuces may become an important article of culture for the sake of their milky juice

juice only. But the cultivation of Lettuces has this further advantage over that of poppies:—after having yielded what milky juice can be obtained from them, Lettuces afford very wholesome and nutritious food for cattle, especially hogs, which are known to be remarkably fond of them.

There have not been wanting instances, as I have been informed, of Lettuces having been sown purposely to be given to hogs, particularly when first weaned.

Since writing the above, I find a similar discovery has recently been made in America, the particulars of which are detailed in the last Volume of the Transactions of the American Philosophical Society just published. The experiments that were there tried corroborate the one made by Dr. Pearson.

Yours, &c.

EDMUND CARTWRIGHT.

April 10, 1801.

Mr. CHARLES TAYLOR.

PAPERS

ON THE

POLITE ARTS.

POLITE ARTS.

The Thanks of the Society were this Session voted to Mr. TIMOTHY SHELDRAKE, of the Strand, London, for the following Communication on the Nature and Preparation of DRYING OILS for painting Pictures; being an Addition to his former Remarks, published in the Sixteenth and Seventeenth Volumes of their Transactions.

SIR,

IN the year 1797 I communicated to the Society, some papers on the preparation of vehicles for painting; the intention of which was to point out such as gave brilliancy and duration to colours, and were probably similar to, if not actually the same as, those which were

were used by those artists who were most celebrated for their skill in the art of colouring. As the facts contained in those papers were likely to be useful to such as practised the art of painting, and as I declared that I had no expectations of premium or compensation for this communication, the Society voted me their greater Silver Pallet; and it has been resolved to publish the papers in the order in which they were received from me.

In N° I. I merely stated the fact, that colours mixed with solutions of amber or copal were more brilliant and durable than the same colours when mixed with drying oils; and I offered to make farther communications to the Society on this subject, if required.

Having been requested to do so, I communicated the following (N° II.) memorandums, On the nature and preparation of Drying Oils, composed with

a view

a view to the improvement of such as are used by artists, as vehicles for painting.

The above-mentioned paper was shown to some artists, who gave it as their opinion that the vehicle proposed was not new, and it was thought impossible to paint with it. To this I replied, that I knew it was not new, and believed it to be the vehicle used by many of the older painters, particularly such as were most celebrated for their skill in colouring: and I digested the fruits of my researches on this part of the subject in the paper N° III. entitled, "Conjectures tending to show that the Vehicle described is similar in principle, if not identically the same, as that used by several of the old Painters," &c.

In this paper it is mentioned, that a part of the peculiar effect of the Venetian pictures is occasioned by the method or process used in painting them; and being asked my opinion on this part

of

of the subject, I communicated the paper N° IV. which has been printed in the Sixteenth Volume of the Society's Transactions, page 279, with the title of " Dissertation on Painting in Oil, in a manner similar to that practised in the ancient Venetian School;" and another paper, N° V. containing " An Account of my Method of purifying the Oils, dissolving the Resins, and compounding them together, so as to form Vehicles for Painting or Varnishes." This paper has been published in the Seventeenth Volume of the Society's Transactions, page 283.

It is evident these papers were written singly at the time they were communicated; and though each of them may be thought satisfactory, with respect to the particular subjects of which it treats, yet as a whole they are defective; and are in that respect undoubtedly different from what they would have been, had I arranged my materials so as to form one dis-

dissertation on the subject. As it is believed that they may convey useful hints to those who are engaged in the Art of Painting, it has been thought advisable to restore them to that connected form in which they were communicated by me, and to thus print them in the Society's Transactions, merely referring in their proper places to those parts which have already appeared in the former volumes.

N° II. *On the Nature and Preparation of Drying Oils; with a View to the Improvement of such as are used by Artists, as Vehicles for Painting.*

Expressed Oils, considered with a view to the painter's use of them, may be divided into two kinds; first, such as are capable of drying in some circumstances by themselves, and always with certain additions; and secondly, such as

cannot be made to dry by any means whatever.

Of the first, which I shall call Drying Oils, there are three in common use, viz. linseed, nut, and poppy oil. The first is darkest coloured, and dries the soonest; the second is lighter, but does not dry so soon; and the third has least colour, and dries slower than either of the others.

By a process, which it is perhaps needless to describe here (*see Vol. xvii. page* 281), I have succeeded in separating from each of those oils, a mucilage or gum, in a liquid state, and capable of mixing with water in every proportion, though, when thoroughly dry, it would not dissolve in cold water; but my experiments on this head were not carried to any great length. It is to be remarked that linseed oil afforded most of this gum, nut oil the next largest quantity, and poppy oil the least of all.

Olive

Olive oil, when treated in the same manner, afforded none of this mucilaginous substance; whence I was led to conclude that the essential difference between the drying Oils, and those which do not dry, consists in this:—that the latter either contains no mucilage or gum, or that it is so intimately combined with its other principles, that it cannot be separated from them in that peculiar manner which always takes place in Oils which dry by themselves, or when mixed with colours.

If drying Oil is exposed to the air, in a shallow vessel, and left at rest, a pellicle is soon formed on the top, and becomes externally perfectly dry. If this be removed, as econd will be formed in the same manner; and if this experiment be repeated many times on the same quantity of oil, without moving or shaking the vessel, it will be found that the second pellicle will require more time to form it than the first, and so on, till

it will be found difficult to get it fairly skinned over in a considerable time. The same effect takes place, in a less visible manner, in every quantity of drying Oil which is united with colours in a picture.

From this experiment it is to be concluded, that drying Oils exert that faculty by throwing up their mucilaginous parts, which become solid when at rest, and in contact with the air.

The ingredients added to Oils to make them dry faster, viz. calces of lead, saline substances, earths or gums, are such as unite with and increase the quantity of those parts which float to the top, and form a skin, more or less dark, over the colours originally mixed with them. If we consider the nature of these ingredients, we shall be at once enabled to account for a fact universally known, viz. that in proportion to the strength of the drying Oil used in painting a picture its colour becomes depraved. It

will be injured and finally destroyed, by being kept in a damp situation, excluded from a free circulation of air, or placed under a glass.

The desideratum is to prepare Oil or other vehicle for painting, so that the colours, when mixed with it, shall not be debased under any of the above-mentioned circumstances. It must be so prepared or used, that it shall serve as a cement to unite and bind the colours, without skinning over them. It must likewise not contain those principles which always exist in the calces of lead, saline, or earthy substances, which from the first deprave the colours, and attract particles from the air, under peculiar circumstances, which increase that depravity, till at last the appearance of the colours is totally destroyed.

It is only among the resins or bitumens that we can expect to find a substance possessing the properties requisite to give to colours all the brilliancy

and durability of which they are susceptible. My first attempts and experiments were made with solutions of mastic and sandarac in the painters oils; but though these compositions possessed more brilliancy than the common drying oils, they were liable to a considerable objection; for they did not dry readily, and when dry, were easily acted upon by all the common solvents for resinous substances, and on that account must be very deficient in durability, which is one of the most necessary qualities I wished to discover.

The difficulty with which amber is in any way dissolved, suggested the propriety of trying that substance. Accordingly I dissolved it, in each of the painters oils, by Dr. Lewis's process, without injuring its colour; and this solution was made in the common way. It was much darker coloured in itself, but produced scarcely any difference in effect when mixed with colour. By experiments

periments with each of these solutions I ascertained the following facts, viz.

Every colour, and all the tints compounded from it, were more brilliant than corresponding tints and colours mixed with the best drying Oils to be procured from the shops.

Colours mixed with amber, after having been shut up in a drawer for several years, lost nothing of their original brilliancy. The same colours tempered with oils, and excluded from the air, were so much altered, that they could scarcely be recognized.

Colours tempered with amber were laid on plates of metal, and exposed (both in the air and close boxes) for a long time, to different degrees of heat, from that of the sun in summer to the strong heat of a stove, without being injured. It is needless to observe that oil colours cannot undergo the same trials without being destroyed.

These colours, when perfectly dried in any way, were not acted upon by spirit of wine and spirit of turpentine united. They were washed with spirit of sal armoniac, and solutions of pot-ash, for a longer time than would destroy common oil colours, without being injured.

They dry as well in damp as in dry weather, and without any skin upon the surface. They are not liable to crack, and are of a flinty hardness; whence it appears that this vehicle possesses every desirable property, and it is presumed may be a discovery of some importance to artists.

Having succeeded thus far with amber, I tried the same experiments upon solutions of gum copal, which is nearly as hard and insoluble as amber itself. The result of these was the same as the former, except that with copal the colours were something brighter than with amber. As it is extremely troublesome

to

to dissolve the copal and amber, I tried those solutions of them in oil which are sold in the shops. When good, I found them to answer as well as my own. This is a great convenience, as many might be deterred by the difficulty of preparing this vehicle, who may willingly use it, as it thus to be procured without that trouble.

The Method of using the Solution of Amber or Copal, as a Vehicle for painting.

The cloth or other substance to be painted on, should be prepared with some colour fully saturated with drying oil; or it will be better done with the same vehicle to be used in painting. If it is not fully saturated, it will absorb some of the vehicle from the colours, which is what is commonly termed the colours sinking in.

All the colours which require grinding, should be previously ground in spirit of turpentine. All the pure parts should be tempered

tempered with such a quantity of the vehicle as will enable them to lie on the pallet. The white should be tempered as stiff as possible. All the tints should be made by mixing the colours so prepared without any more of the vehicle, but they should be diluted with spirit of turpentine, if necessary for working.

If the ground is properly prepared, and the above caution observed in tempering the colours, it will be found that all the dark colours in the picture will bear their full tone, and have a demi-transparency, which increases their native brilliancy, without the dingy appearance so common in ordinary oil-painting. The admixture of white increases the body of the colours progressively, till there will be left in the lightest parts, only so much of the vehicle as will bind the colours, and give them their full tone, but with very little of a shining appearance. When the picture is perfectly dry, it should be varnished with a

mastic

mastic or similar varnish. Perhaps the best would be copal varnish made by solution in spirit of turpentine, or spirit of wine.

The rationale of this vehicle seems to be this: the amber and copal, when dissolved in oil, form a homogeneous mass, which dries by inspissating, instead of skinning over, like the common drying oils, which consist of heteregeneous parts, some of which separate and dry on the top.

As the amber and copal are not soluble in any of the menstruums which dissolve most resinous substances, pictures painted with them cannot be injured, if cleaned with those menstruums: and as they are extremely hard, and the most durable substances of their class, they protect the colours from every kind of injury, more effectually than any other known vehicle.

N° III.

N° III. *Conjectures tending to show that the vehicle which I have described, is similar in principle, if not identically the same, as that used by several of the older Painters, who were eminent for their skill in Colouring.*

Lomazzo, an eminent painter, and pupil of Leonardo da Vinci, published a Treatise on Painting, in which it is mentioned that linseed or nut oil was generally used for painting: he likewise observes, that powdered glass was used as a dryer. As Lomazzo was blind when he published his treatise, he could have no motive for keeping any thing which he knew secret; whence it is to be concluded, that those oils were generally used for painting in his time, and that he knew of no exceptions to the practice.

In one part of L. da Vinci's Treatise on Painting, he mentions *nut-oil and amber*

amber. As we know that amber gives peculiar brilliancy to colours, that L. da Vinci was peculiarly celebrated for the richness of his colouring, and are informed from his own writings that he was acquainted with solution of amber in nut-oil, it is to be presumed *that* was the vehicle he used. If this supposition is not to be admitted, we must believe that he knew how to dissolve amber in nut-oil (a process at that time both tedious and troublesome), without knowing the best use to which he could possibly apply it.

Leonardo's biographer says, " When he was at Rome, Leo X. resolved to employ him. Leonardo hereupon sets himself to the distilling of oils, and the preparing of varnishes to cover his paintings withal: of which the Pope being informed, said, pertly enough, that he could expect nothing of a man who thought of finishing his works before he had begun them. Leonardo therefore

therefore left Rome without having been employed."

I must beg leave to dissent from his Holiness's opinion. If my idea of Leonardo's vehicle be just, it was natural for him to begin the preparation of it as soon as he knew that he was to be employed as a painter: and as the spirit of that time led every one who made any useful discovery, to preserve it as a valuable secret, it was equally natural for him to account for his employment by saying that he was preparing varnishes. Whatever his secrets were, they remained unknown to the world till 1651, when his Treatise on Painting was published.

The next intimation of solutions of amber which I have obtained is from the works of Boyle, who gained much of his information from Italian chemists; whence it is evident that the knowledge of this preparation is of long standing in that country; and its use, if it was

used

used at all in the arts, is to be sought for in the works of Italian artists.

Whoever examines the Venetian pictures with attention, considers that the best artists of that school were remarkable for the facility with which they worked, and reflects on some passages in Lomazzo, will be disposed to admit that the peculiar skill of the Venetian painters depended on three circumstances, viz. the colours they used, their method of using them, and the vehicle they worked with. Of the first, Lomazzo gives positive information: the second can never be known without information equally positive; but of the vehicle some knowledge may be obtained by way of analysis. Till that knowledge is obtained, I may perhaps be excused for hazarding the following conjectures.

If my experiments have not misled me, I am entitled to draw the following conclusions from them. Wherever a picture is found possessing evidently superior

perior brilliancy of colour independent of what is produced by the painter's skill in colouring, that brilliancy is derived from the admixture of some resinous substance in the vehicle. If it does not yield on the application of spirit of turpentine and spirit of wine separately or together, or to such alkalies as are known to dissolve oils in the same time, it is to be presumed that vehicle contains amber or copal, because they are the only substances known to resist those menstrua.

I have been told, and some experiments of my own prove the information to be true, that the Venetian pictures, considered with respect to vehicle, are of two kinds: for some are extremely hard, and not at all affected by any of the above menstrua; others are similar in colour, but so tender that it is scarcely possible to clean them without injury, and in that respect are little superior to mere turpentine colours. The first, in consequence

consequence of the data which I have laid down, incur the suspicion of being painted with amber or copal, but how are we to distinguish with which?

As each of these substances resists equally the common menstrua, perhaps the distinction can only be made by ascertaining the date of the picture. For example:—if it is found to have been painted before copal was known in commerce, it may safely be said to have amber for its basis; but if it has been painted after that period, I know of no method of distinguishing which of the two was made use of. As copal could not have been known, as an article of trade, before the seventeenth century, it follows that all pictures painted before that period, and possessing the properties I have described, must have amber for the basis of their vehicle. As this exception necessarily includes all the Venetian artists of the first class, we are therefore authorised to conclude that, if the works

of these artists can bear the test of the menstrua I have mentioned, amber was the basis of the vehicle with which they were painted.

I once saw a recipe for dissolving copal, said to have been brought from Venice towards the close of the last century. The process was, to melt Venice turpentine upon the fire, to add gradually copal powdered, stirring them together to be united in fusion, and afterwards spirit of turpentine, in order to dilute it to the consistence of varnish. I tried this process, but it did not succeed.

Upon inquiry I found that the Venice turpentine of the shops was only common resin, dissolved in spirit of turpentine to a proper consistence; whence the cause of my failure was evident. Reflecting on the commercial pursuits of the Venetians in the fifteenth and sixteenth centuries, I was led to conjecture that the substance called originally Venice

nice turpentine was the product of some country intimately connected with them. Pursuing this idea, I procured, with much difficulty, some Chio turpentine, repeated my experiment, and succeeded completely. Besides the property of uniting easily with copal, it had others that excited my attention. Common resins, if exposed to fire, burn with extreme fierceness and rapidity; but when some of this was laid on the point of a knife, and held in the flame of a candle, it melted and dropped down before it began to burn. It emitted a peculiarly grateful smell; was of a most beautiful pale gold colour; was more brilliant than any turpentine I had ever seen; and when diluted to the consistence of varnish, perfectly resembled in colour, a solution of copal which I made in spirit of turpentine with camphor.

I showed some of this to a gentleman who was conversant in such subjects. He told me that, when at Venice, he fre-

quently rubbed pictures violently with his handkerchief, to try if he could discover what they were painted with; and when so rubbed, they smelt exactly like what I then produced to him.

As I had previously perfected what I thought to be a superior vehicle, with which this could not vie in hardness and durability, I did not prosecute my experiments with this any farther; but as it unites rapidly with copal, and possesses all its visible properties, I may be permitted to conjecture that it would have similar effects when mixed with colours: and if there was any second, inferior, and common vehicle, similar in its visible properties to the last, and so much within the reach of the most ordinary painters, as to give their works one common mark with those of the first artists, it would be difficult to point out a substance more likely to afford it than this which must have been common in their own country, since its name is still

attached

attached to substances of the same class throughout Europe, though its real properties are now but little known.

If this was the basis of the common Venetian vehicle, it might have been used with or without oil. If the latter, the works of the common Venetian painters must have been mere varnish painting: if the former, it must have been compounded with the oil, according to the principles I have already explained. I am inclined towards the latter opinion, from having heard an observation attributed to Bombelli, a celebrated Venetian painter, who said, "*That he wished his pictures to dry as fast as possible, that the oil in them might not rise to the surface, and turn yellow.*"

To this conjecture it may be objected that turpentines and compounds from them do not dry well. I am not prepared to answer this objection, as I have made no experiments relative to

it; but it certainly is not conclusive, as such compounds may not dry well in this country, though they may in the warm climate of Italy.

In the *Maniere d'imprimer les Tableaux*, published by Le Blond at Paris, 1740, is a recipe for the varnish he used on the coloured prints executed by him, in this country, before he went to France. It is as follows:—" Take four parts of balsam of capivi and one of copal. Powder and sift the copal; and throw it by degrees into the balsam of capivi, stirring it well each time it is put in: I say each time; for the powdered copal must be put in by degrees, day after day, in at least, fifteen different parts. The vessel must be close stopped, and exposed to the heat of the sun, or a similar degree of heat, during the whole time; and when the whole is reduced uniformly to the consistence of honey, add a quantity of warm turpentine; *Chio turpentine is the best.*"

Le Blond's

Le Blond's prints were long neglected, and are now forgotten. Whatever difference of opinion may prevail respecting them, there can be none respecting his varnish, as I have seen some of these prints in perfect condition, notwithstanding they had been thrown carelessly about for nearly sixty years.

Le Blond was a pupil of Carlo Maratti. He died at a very advanced age, leaving behind him the character of an ingenious projector. It is probable that he might collect much information analogous to his pursuits during a long life; but it is more probable that he obtained much of it where he received his education. Thus, wherever we find notices of the use of these substances in the Arts, they invariably lead us towards Italy, where they certainly were first known.

I have thus detailed the circumstances which impress me with a conviction that the vehicle I have offered to public notice

is, in substance, the same as that used by the best colourists of the Italian schools. What impression the facts I have enumerated may make upon others I know not: but still the truth of my opinion must be determined by experience; for it would be of small consequence to prove that this vehicle was used in former times, unless it can likewise be made evident that it will be useful to the present race of Artists.

Yours, &c.

TIMOTHY SHELDRAKE.

Strand,
February, 1801.

MR. CHARLES TAYLOR.

PAPERS

IN

MANUFACTURES.

SPECIMEN OF PAPER

FROM THE

PAUT-PLANT.

MANUFACTURES.

The Sum of TWENTY GUINEAS, being the Premium offered for making PAPER from raw VEGETABLE SUBSTANCES superior to any hitherto manufactured from such Substances, was this Session adjudged to Mr. THOMAS WILLMOTT, of Shoreham in Kent; from whom the following Accounts and Certificates were received.

SIR,

AT the particular request of Mr. Sewell, bookseller, in Cornhill, I made some Paper from Gunny-bags, he having very much wished something might be done to reduce the high price of rags.

I was afterwards informed that a Premium of Twenty Guineas was offered by the Society of Arts, &c. for ten reams

reams of useful Paper made from raw Vegetable Substances. I had made only six reams from the above article; and on mentioning it to Mr. Sewell, he told me he was apprehensive the Society would not allow the Premium for what I had made, it not being the quantity specified, nor made from the raw material; he therefore undertook to get me a quantity of the raw material from which Gunny-bags are made, that I might make the ten reams as specified. I have now made that quantity, and have sent one ream to the Society, and the other nine I have left with Mr. Sewell.

If the Society should think I merit the Premium, or any part of it, for the pains and trouble I have taken, I shall think myself much honoured by such mark of their favour.

I remain, SIR,

Your humble servant,

T. WILLMOTT.

Shoreham, Kent,
November 6, 1800.

Certificates were sent from William Strip and John Penfold, confirming the above; and that they had prepared the article, and saw it made into paper, and sent back to London on the 31st of October.

THIS is to certify, that I, JOHN SEWELL, of N° 32, Cornhill, having had a hint from a literary gentleman, long resident in India, that a specimen of paper which I had approved, was made in the East Indies from a vegetable called the Paut Plant, I applied to some of the principal persons in the Company's warehouse for that article, and was informed that a large quantity had been imported into England about seven years ago; that the whole was sold at from 18*s*. to 20*s*. per cwt. to various persons concerned in the sail, hammock, sack, and packthread business; that some went to Manchester and Scotland,

Scotland, but that none then remained in the Company's warehouse except samples.

From such samples, and what remained with the brokers, I collected enough to make the few reams of Paper manufactured by Mr. Thomas Willmott.

The first attempt failed, by the Paper being spoiled in bleaching; the Paper now sent, is the result of a second trial.

From further experiments made in my presence, by an ingenious chemist well skilled in the manufactory, it is found that gunny-bags, ropes, and other waste materials made from the same substance, will make a better paper.

It is also found by experience, that old rags, which have been used on the table, bed, or for apparel, make better paper than new flax or hemp.

Gunny-bags may be had from most grocers, gunpowder-makers, and dealers

in

in India goods; as the Company send nearly all their importations in those bags. They may be bought in almost any quantity, at so cheap a rate as from a farthing to a penny per pound; and if introduced for manufacturing wrapping and other inferior Papers, they cannot fail to reduce the present high price of rags.

JOHN SEWELL.

Cornhill,
November 6, 1800.

Mr. CHARLES TAYLOR.

SIR,

SINCE I saw you, it has occurred to me, that the circumstance of ships being engaged to bring home rice from Bengal, may afford a better opportunity, than I first imagined, for bringing over a considerable quantity of *paut*. Experience has shewn that some ships cannot take such heavy articles as rice and sugar,

sugar, to the extent of their chartered tonnage. As *paut* may be shipped from Bengal at about 4*s*. per cwt. if it is put on board without being packed into bales, it seems an advantageous article to occupy that space in the upper part of rice ships, which must otherwise remain entirely vacant. As none of the *paut* hitherto brought over, has sold for less than 20*s*. per cwt. there appears to be ample room for profit to the importer, and very little capital risked.

It is procured at the lowest prices, and in the greatest abundance, at Maulda and Buddaul, where it costs barely 3*s*. per cwt.; in Calcutta the prices are higher. This article must be carefully distinguished from the *sun* which is deemed hemp, and is liable to a heavy duty. *Paut* is only liable to a small duty: it is known in India, and has been sent to Europe, by the name of *jute*, and may be characterised as the article

article with which gunnies are always made in Bengal.

I remain, SIR,

Your very humble servant,

H. W. GOODHALL.

To Mr. SEWELL.

*** The Society have been informed by Mr. Sewell, that two varieties of the Paut plant have been cultivated at Calcutta, viz.

Bhungee Paat, the Corchorus Olitorius of Linnæus, and the Ghee Naltha Paat, or Corchorus Capsularis.

The CHICOREE PLANT having for some years past been cultivated upon a very extensive Scale in Germany, for the use of its Root as an excellent Substitute for Coffee, and for the advantage of its Herbage in feeding Cattle, the following Account of the Culture of the Plant, and Method of manufacturing Coffee from its Root, was sent from Germany, by Mr. JOHN TAYLOR, to the Secretary; with some of the Seed, and Samples of the Root in different Stages of its Preparation, which are placed in the Society's Repository for public inspection.

Mode of cultivating the English Chicoree Plant, Cichorium Intybus of Linnæus, Cichorien Wurzel, or Hindlæufte, of the Germans, as recommended by the Chicoree Coffee Manufacturers at Dresden.

FOR cultivating the Chicoree Plant a sandy or loamy soil answers best, clay or heavy soil is not proper, because the

the roots cannot penetrate a sufficient depth, and because in such ground they are more difficult to be pulled up, the roots being usually half-a-yard in length. The ground must be either delved a spade or more in depth, or ploughed very deep by two ploughs following each other in the same furrow; this work is best done in autumn. The land must afterwards be lightly ploughed at the time of sowing; but it may be ploughed in like manner in spring, if omitted in autumn, then harrowed and immediately sown. Chicoree does not properly require stable manure, because the roots do not taste so well where cattle dung is used as in land unmanured. Fallow land, or land on which one crop has been grown, is very proper. If the ground be poor, marl, gypsum, lime, or the mud from ponds, are recommended as manures, or composts may be formed from two thirds of loam, and one third of dung for sandy soil; or of

two thirds sand and one third dung for loamy soil; by putting the mixture in a heap for some months, watering it repeatedly, and turning it with the spade some weeks before used. By adopting this method the Chicoree will be excellent, and the ground greatly improved for future cultivation.

As the roots run deep, the dung, when used, should be laid low. Changing the land each year is better for the Chicoree, and also for the ground, as by the weeding and working it is in good order for other crops. If the Chicoree be drilled and potatoes grown betwixt the rows, Chicoree may be planted two years together. As potatoes require to be well manured, a crop of corn may then be taken from the land, and Chicoree again planted for one year.

The seed of the preceding year should be chosen for sowing: it should be cleaned from the seeds of weeds, and be mixed with ashes and earth, to enable

it

it to be sown in such a manner that the roots may stand from four to six inches asunder.

Some persons steep the seed for twenty-four hours, in a solution made from three quarts of dung-liquor, six quarts of water, four ounces of common salt, and three ounces of saltpetre, to three pounds of seed; and if that quantity of water be not sufficient to moisten it, add more. After the seed has been steeped therein for eighteen or twenty-four hours, it may be mixed with ashes and earth as above mentioned, and sown on ground laid out in large flats previously harrowed: after sowing, it must be harrowed with one harrow, in the manner that clover and rape seed is covered.

On a Dresden acre of 300 square perches, of something more than fifteen English feet each, containing in the whole 67,500 square feet, three pounds

and a half to four pounds of seed are sown, according to the goodness of the seed.

The seed may be sown from the middle of April to the middle of June, so that towards autumn the roots may be drawn in succession as the land was sown sooner or later.

After the seed is sown, nothing more is required than to keep it clear from weeds, and either to draw out the thickest plants in August for use, to allow more room for the smaller ones, or to pluck out the smaller plants, which is the better way, as it will occasion the larger ones to increase until September and October, when they may be dug up to advantage.

The roots, when taken up, must be separated from the stalks, leaves, and fibres, which are commonly used for feeding cattle; the Chicoree Coffee manufacturers pay from 3*s.* to 4*s.* per cwt. for such green roots.

Those

Those who wish to raise seed for themselves on a small scale, must preserve some of the strongest roots in a hole in the earth during the winter, and plant them out in the spring: but those who grow the plants in quantities may reserve a plot of the best plants for that purpose; remembering to pluck out any bad plants from amongst them, as the best seed is only produced from good plants.

The seed must be gathered when the greatest part is ripe, by cutting off the stalk and placing it upright for some days in the sun, binding the top round with a little straw to guard the seed from the birds, and to allow it to ripen more perfectly. It is then beat or thrashed out, according as the quantity may require.

Additional Observations on the Culture and Preparation of Chicoree.

The plants flourish best when they have been thinly sown and remain in such state; but where any vacancies occur, those may be filled up with transplanted roots, placed from four to six inches asunder. When the roots are taken up in the autumn, they are first washed, and then cut by a machine into thin slices; afterwards dried partly in the air, and the drying completed on a malt-kiln. They are then laid aside till roasted: when roasted, they will keep for a year or two in a dry place.

Such roots are best whose thicknesses are from one to two inches; if thicker, they are too coarse; and if thinner, have but little taste. In general the leaves are cut off, and used as food for cattle, some weeks previous to the roots being plucked

plucked up. Some persons strip the leaves several times during the summer, but then there is less produce of the roots.

The roots, when drawn and washed, should be sliced by the hand, or by a machine: they should then be thinly laid upon hurdles in an airy room, and often turned, to prevent them from rotting, and to assist the air in drying them before they are carried to the malt-kiln. If the quantity is small, they may be dried by the common stoves of the room. No more roots should be dug up at once than can be washed and sliced on the same day, if possible.

Manufacture of the Coffee from dried Chicoree Roots.

The dried Roots are roasted in iron coffee-drums, containing from half a bushel to one bushel each; these drums are placed within brick furnaces, in which

which a space of half a foot is left betwixt the brick-work and the drum, on every side, so that the heat may be equally divided: within the drum are thin bars of iron, running lengthways, to shake or divide the roots whilst roasting; during which operation the drum is constantly kept turning by a handle placed on its axis. The criterion of the roots being properly roasted, is, that they are not too dark as if burnt, nor too light-coloured for want of sufficient roasting: the large and small slices should be roasted separately.

After this operation the roots are ground in the manner of flour, in similar mills, and the fine reserved for use; but the coarser part is again returned to the mill, to be finer ground: it is then packed in casks, or put up in paper bags, as may be thought necessary, and preserved dry.

This powder is the Coffee, and may be prepared alone, as common coffee-

berries,

berries, when ground for use; or it may be mixed with one quarter or one half of its weight of genuine West India or Turkey coffee, at discretion. The price at which it is sold, is usually from five-pence to eight-pence per lb. Raw coffee-berries, mixed with the root whilst roasting, improve its odour and quality.

Large manufactories of the Chicoree Coffee are established, with considerable profit to the proprietors, at Berlin, Magdeburg, Brunswick, Dresden, and other parts of the Continent.

The article is become in general demand and use throughout Germany, as a pleasant and wholesome nourishment, in place of West-India coffee, which formed a considerable part of the diet of the inhabitants.

Leipsig,
June 4, 1800.

PAPERS

IN

MECHANICKS.

MECHANICKS.

The SILVER MEDAL was this session adjudged to Mr. H. SARJEANT, of Whitehaven, in Cumberland, for a MACHINE FOR RAISING WATER; from whom the following Account, Description, and Certificates, were received, together with a Drawing of the Machine.

SIR,

I AM sensible that the little Engine, a drawing of which accompanies this letter, can lay no great claim to novelty in its principle; nevertheless it is respectfully submitted to the consideration of the Society, how far its simplicity, and cheapness of construction, may render it worthy of their attention, with a view

to

to its being more generally known and used in similar cases.

Irton-Hall, the seat of E. L. Irton, Esq. is situated on an ascent of sixty or sixty-one feet perpendicular height; at the foot of which, at the distance of about 140 yards from the offices, runs a small stream of water. The object was to raise this to the house for domestic purposes.

To this end a dam was made at a short distance above, so as to cause a fall of about four feet; and the water was brought by a wooden trough, into which was inserted a piece of two-inch leaden pipe, a part of which is seen at A.

The stream of this pipe is so directed as to run into the bucket B, when the bucket is elevated; but so soon as it begins to descend, the stream flows over it, and goes to supply the wooden trough or well in which the foot of the forcing pump C stands, of three inches bore.

D,

D, is an iron cylinder attached to the pump rod, which passes through it. It is filled with lead, and weighs about 240 lbs. This is the power which works the pump, and forces the water through 420 feet of inch pipe from the pump up to the house.

At E is fixed a cord which, when the bucket comes to within four or five inches of its lowest projection, becomes stretched and opens a valve in the bottom of it, through which the water empties itself.

I beg leave to add, that an engine, in a great degree similar to this, was erected some years ago by the late James Spedding, Esq. for a lead-mine near Keswick, with the addition of a smaller bucket which empied itself into the larger, near the beginning of its descent, without which addition it was found that the beam only acquired a libratory motion, without making a full and effective stroke.

To answer this purpose in a more simple way, I constructed the small Engine in such manner as to finish its stroke (speaking of the bucket end), when the beam comes into an horizontal position, or a little below it. By this means the lever is virtually lengthened in its descent in the proportion of the radius to the cosine, of about thirty degrees, or as seven to six nearly, and consequently its power is increased in an equal proportion.

It is evident that the opening of the valve might have been effected, perhaps better, by a projecting pin at the bottom; but I chose to give an exact description of the Engine as it stands. It has now been six months in use, and completely answers the purpose intended.

The only artists employed, except the plumber, were a country blacksmith and carpenter; and the whole cost, exclusive

clusive of the pump and pipes, did not amount to £5.

I am, SIR,

Your humble servant,

H. SARJEANT.

Warwick Court, Holborn.

MR. CHARLES TAYLOR.

In another letter, dated Whitehaven, April 28, 1801, Mr. Sarjeant further observes that the pump requires about eighteen gallons of water in the bucket to raise the counter-weight, and make a fresh stroke in the pump; that it makes three strokes in a minute, and gives about a half-gallon into the cistern at each stroke. He adds, " I speak of what it did in the dryest part of last summer; when it supplied a large family, together with work-people, &c. with water for all purposes, in a situation

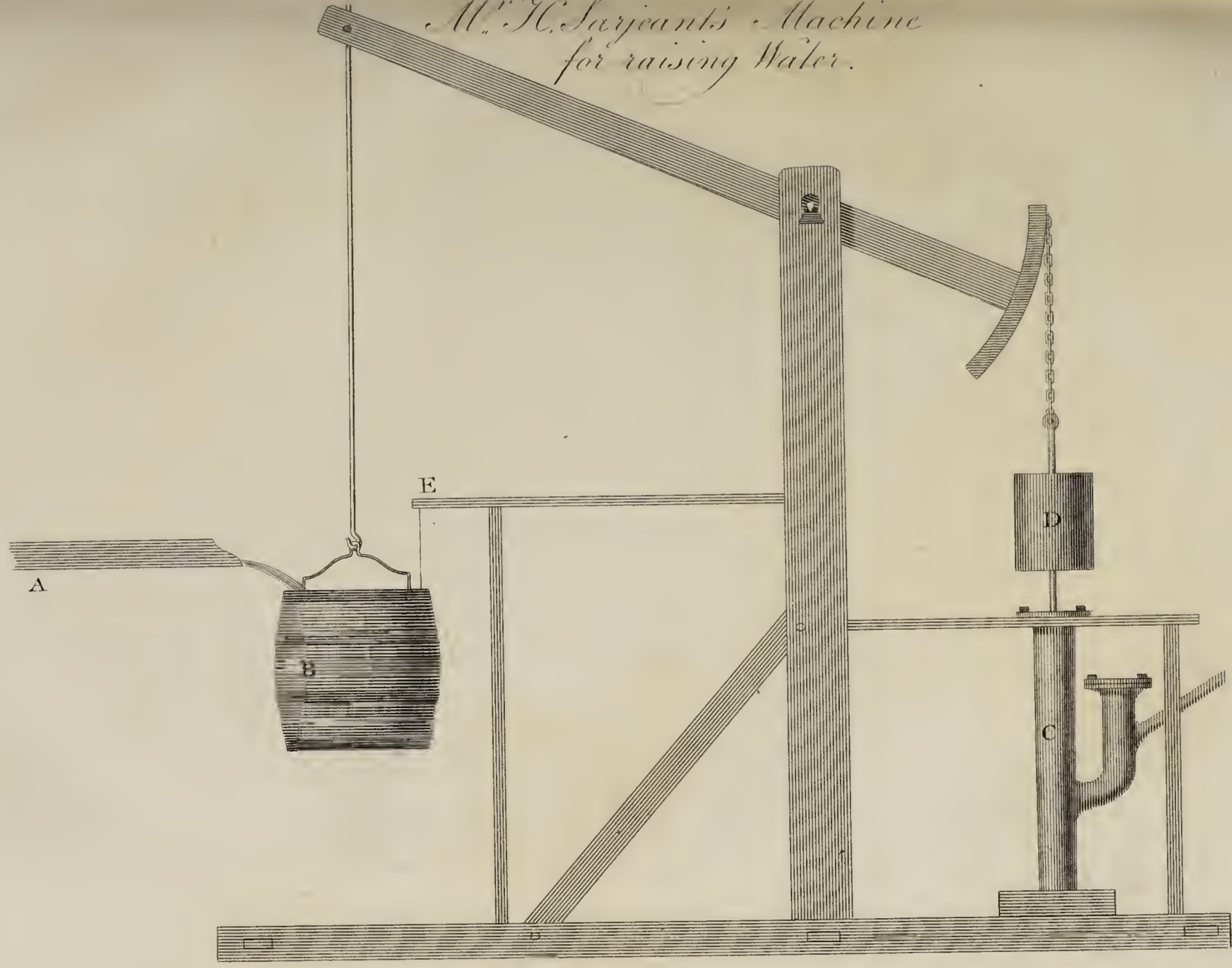
where none was to be had before, except some bad water from a common pump which has been since removed. But the above supply being more than sufficient, the Machine is occasionally stopped to prevent wear, which is done by merely casting off the string of the bucket-valve."

P. S. I have just been informed that a drawing of the Engine, which I had communicated to a person in this neighbourhood, was sent to a Colliery near Swansea some months ago, and that it has already been applied to use there; it is not however sufficiently powerful for the coal-works in this neighbourhood.

The following Certificate accompanied these Letters.

I DO hereby certify, that the Water-Engine constructed near my house, under the direction of Mr. Sarjeant, has been

Mr. H. Sargeant's Machine for raising Water.



Lowry sculp.

been eight months in use, and fully answers the purpose intended.

EDMUND L. IRTON.

Irton-Hall,
March 18, 1801.

I DO also certify the above to be true.

ROBERT WILKINSON,

One of his Majesty's Justices of the Peace for the County of Cumberland.

March 13, 1801.

The Sum of TEN GUINEAS, being the Premium offered for taking Whales by the GUN HARPOON, was this Session adjudged to Mr. ROBERT HAYS, Harpooner of the ship Ipswich, fitted out by Mr. T. Wilkinson, of Wapping, from whom the following Account and Certificates were received.

SIR,

I BEG leave to present you with the inclosed Certificate from Captain Robert Kay, commander of my ship Ipswich, employed in the Greenland fisheries, on behalf of Robert Hays, harpooner of the said ship, for the Premium offered by the Society of Arts, &c. for the taking of Whales, he having struck three.

I am, SIR,

Your obedient servant,

T. WILKINSON.

N° 258, *Wapping*,
November 24, 1800.

Mr. CHARLES TAYLOR.

SIR,

BEING, on the 16th of May, 1800, in the latitude of 80° north, and longitude 6° 30′ east from London, I, ROBERT HAYS, harpooner, shot a Whale about ten or eleven fathoms from the boat, which run nine lines out before we got another harpoon fixed in her: it was four hours from the time she was shot until dead. The length of bone was seven feet four inches. Hackluyt's Head-land bearing E. S. E. distant, by estimation, eighteen leagues.

May 26, 1800, being in latitude 79° 40′ north, and longitude 7° east from London, I shot a Whale about nine fathoms from the boat, which run eight lines out before fastened by another harpoon. It was two hours from the time she was struck until dead. The length of bone was nine feet six inches.

June 18, 1800, being in latitude 79° 30′ north, and longitude 7° 30′ east, I shot

a Whale about eight fathoms distant from the boat, which run eleven lines out before we got another harpoon fixed in her. It was four hours from the time she was shot until dead.

Hackluyt's Head-land bearing E.N.E. distant, by estimation, seven or eight leagues.

The above-mentioned three Whales were struck by me,

ROBERT HAYS.

Witness to the signature,

JOHN WILKINSON.

THIS is to certify the above statement from Robert Hays, harpooner, of the ship Ipswich under my command, is a perfect true and just account; as witness my hand, this 24th of November, 1800.

ROBERT KAY.

No. 11, *Princes-street*,
Rotherhithe.

The

The Sum of TEN GUINEAS was this Session adjudged, as a Bounty, to Mrs. J. BESANT, of Brompton, for a new-invented Undershot WATER-WHEEL; from whom the following Account was received, together with Models, upon the new and old construction, for comparative experiments.

SIR,

I BEG leave to lay before the Society some observations respecting the common Undershot Water-wheel, and to point out the superiority of that of my invention.

First,—In common Water-wheels more than half the water passes from the gate through the wheel, without giving it any assistance.

Secondly,—The floats coming out of the tail-water are resisted with almost the

the whole weight of the atmosphere, at the instant they leave the surface of the water.

Thirdly,—The same quantity of water which passed between the floats at the head, must of course pass between them at the tail, and consequently impede the motion of the wheel.

In the Water-wheel of my invention,

First,—No water can pass but what acts, with all its force, on the extremity of the wheel.

Secondly,—The floats coming out of the water in an oblique direction, prevent the weight of the atmosphere from taking any effect.

Thirdly,—Although the New Water-wheel is heavier than that on the old construction, yet it runs lighter on its axis, the water having a tendency to float it.

Fourthly,—By experiments made with the models, proofs have been shown, that the new Wheel has many advantages

over

over the common wheel, and that, when it works in deep tail water, it will carry weights in proportion of three to one, so that it will be particularly serviceable for tide-mills.

I hope on trial, before the Society, my invention will prove successful, and am,

SIR,

Your obedient servant,

J. BESANT.

No. 26, *Brompton.*

To the SECRETARY of the
Society of Arts, &c.

*** Repeated experiments of the above Invention were made by the Committee; from the result of which it appeared to possess some advantages over the common Wheel, and to have a greater power of action.

Description

Description of the late Mr. Besant's Water-wheel. Plate IV. Fig. 1 & 2.

A. The body of the Water-wheel, which is hollow in the form of a drum, and is so constructed as to be proof against the admission of water within it.

B. The axis on which it turns.

C. The float boards, placed on the periphery of the wheel. Each board is obliquely fixed firm to the rim of it, and to the body of the drum.

D. The reservoir, containing the water.

E. The penstock, which regulates the quantity of water running to the wheel.

F. The current of water which has passed the wheel.

Fig. 2. Is a front view of the Water-wheel, shewing the oblique direction in which the float boards C are placed on the face of the wheel.

The

The GOLD MEDAL, or FORTY GUINEAS, at the option of the Candidate, being the Premium offered for an Improvement in the Method of DRIVING BOLTS INTO SHIPS, was this Session adjudged to Mr. RICHARD PHILLIPS, of Bristol; from whom the following Account and Certificates were received, and who made choice of the Pecuniary Reward. Models of the Machine are placed in the Society's Repository.

MR. RICHARD PHILLIPS, of Bristol, in several letters sent to the Society, states, that he had invented a method of driving Copper Bolts into Ships, without splitting the heads or bending them; and that by means of tubes contrived by him, for the purpose, this could be effected without difficulty, and had been satisfactorily executed in the presence

sence of several of the principal ship-builders of Bristol.

A Certificate accompanied these letters, from Mr. William James, and Mr. Samuel Hast, ship-builders, and also from Mr. George Winter, of Bristol, testifying that they had tried the experiment of driving Copper Bolts through the jointed Cylinder invented by Mr. Phillips; and that they so far approve of it, that they mean to adopt the general use of them, for driving Bolts in all directions, particularly on the outside of Ships, whether iron or copper; as this method not only prevents the Bolts from bending, but keeps the heads from splitting, and enables the Bolts to be driven much tighter, than by any other means with which they were acquainted. They further add, that by the application of Mr. Phillips's Cylinder and Punch, a Copper Bolt which had been crippled at the edge of the hole, and which could not be started by a mall, went up with ease

ease in a perpendicular direction in the flat of a ship's bottom, not four feet from the ground.

This Certificate was witnessed by

Mr. William Holden.

The same facts are also certified by Mr. Thomas Walker, and Mr. James M. Hillhouse, of Bristol, who add their opinion, that the adoption of this invention, in the different dock-yards of the kingdom, will prove very advantageous.

*** Since Mr. Phillips's first application to the Society for a premium, he has made a considerable improvement in the construction of his Tubes. The description and engraving hereunto annexed are of the improved kind: models of both are, however, preserved in the Society's Repository, for public inspection.

The

The instrument employed for driving the Bolts, consists of a hollow tube formed from separate pieces of cast iron, which are placed upon the heads of each other, and firmly held thereto by iron circles or rings over the joints of the tube. The lowest ring is pointed, to keep the tube steady upon the wood. The Bolt being entered into the end of the hole bored in the wood of the ship, and completely covered by the iron tube, is driven forward within the cylinder by an iron or steel punch, placed against the head of the Bolt, which punch is struck by a mall: and as the bolt goes further into the wood, parts of the tubes are unscrewed and taken off, till the Bolt is driven home into its place up to the head.

The tubes are about five inches in circumference, and will admit a Bolt of seven eighths of an inch in diameter.

Reference

Reference to the Engraving of Mr. R. Phillips's Method of driving Bolts into Ships. Plate IV. Fig. 3, 4, 5, 6.

Fig. 3.

A. The copper bolt, with one end entered into the wood, previous to fixing the tube.

B. A piece of timber, or ship's side, into which the bolt is intended to be driven.

Fig. 4.

CCCC. The parts of the iron tube fastened together, ready to be put on the bolt A.

DDDDD. Iron or brass rings with thumb-screws, placed over the joints of the tube, to hold them firm together.

EEEEE. The thumb-screws, which keep the rings and tubes firm in their proper places.

F. Two points formed on the lower ring: they are to stick into the timber, and to enable the tube to be held firm in its place.

Fig. 5.

Shows the separation of the parts of the tube which is effected by slackening the thumb-screws and rings.

To put them together, you slide the rings over the joints, placed as close as possible; then, by tightening the thumb-screws, you will have them firm together, and may continue the tubes to any length, from one foot to whatever number is required.

Fig. 6.

GH. Two steel punches or drifts, to be placed on the head of the copper bolt within the tube, whilst driving. The blow given upon

Mr. Besant's Water Wheel.

Fig. 1.

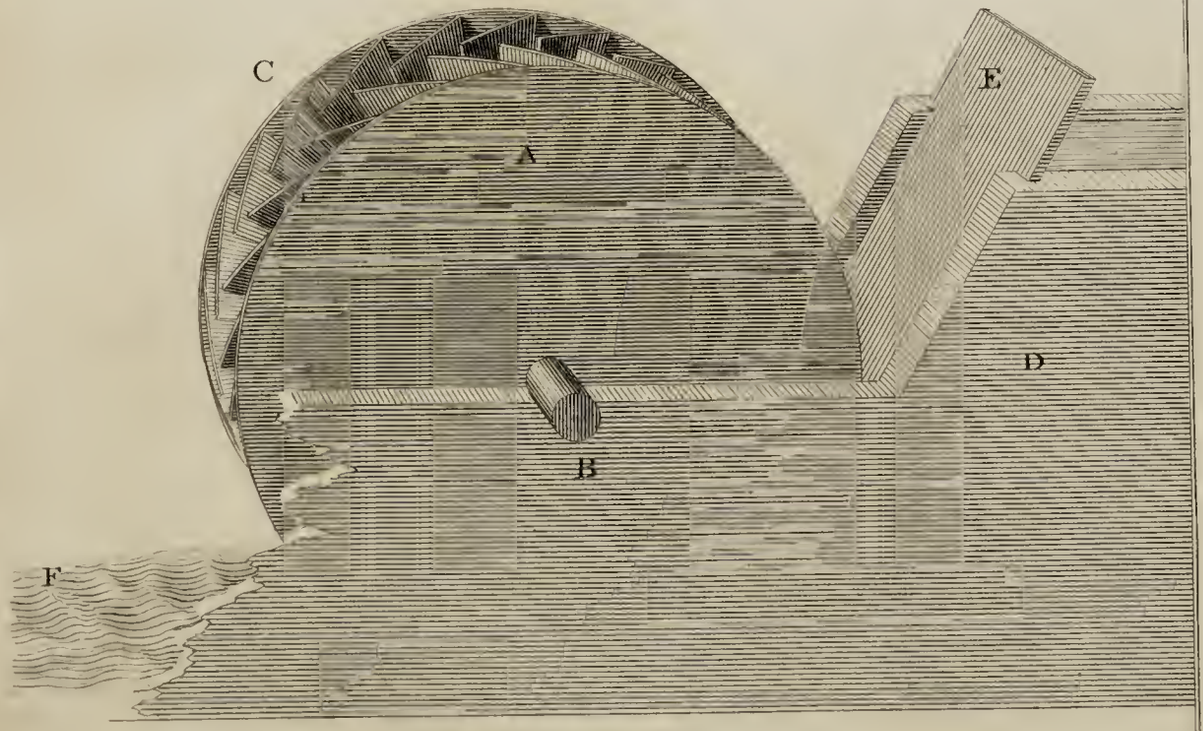
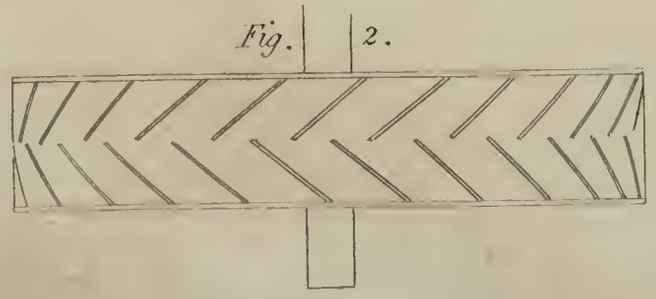


Fig. 2.



Mr. R. Phillips's Tube for driving Bolts into Ships.

Fig. 3.

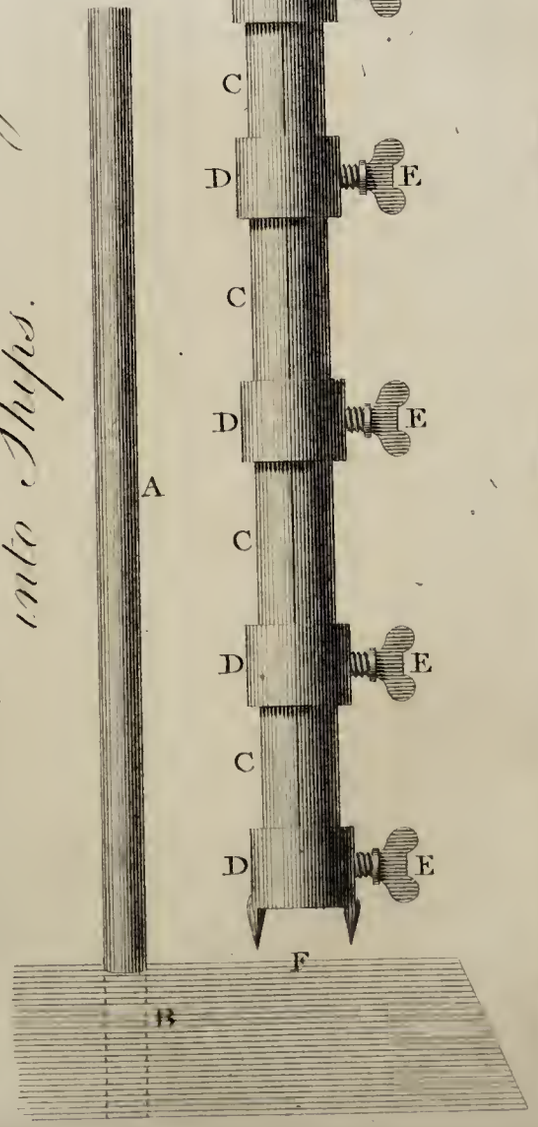


Fig. 4.

Fig. 5.

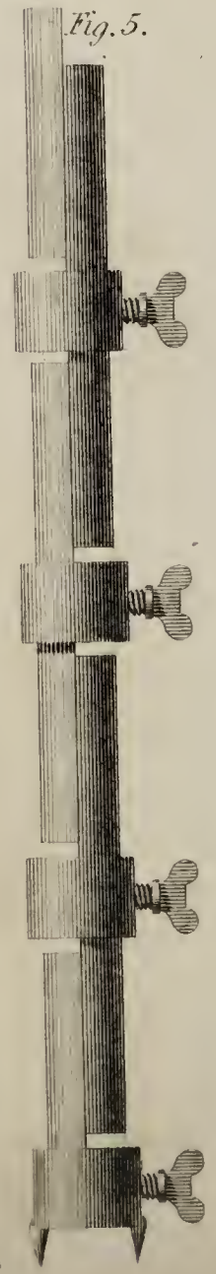


Fig. 6.

Lowry Sculp.

upon the punch drives forward the bolt. The shortest of them should be used first, and, when driven nearly to its head, should be taken out of the tube, and the longer punch applied in its place.

A Bounty of TWENTY-FIVE GUINEAS was this Session voted to Mr. THOMAS ARKWRIGHT, of Kendal, for his Invention of a Machine for RAISING ORE, &c. from Mines; a Plate and Description of which Machine are hereunto annexed, and a complete Model reserved in the Society's Repository, for the inspection and use of the Public.

SIR,

KNOWING that the Society of Arts, &c. always stand forward in support of ingenuity, I take the liberty of sending you the Model of a Machine, for raising Ore from Mines, and likewise for raising Water, by the same operation, if required, which I beg you will present to the Society.

I am, SIR,

Your most obedient servant,

THOMAS ARKWRIGHT.

Kendal, in Westmoreland,
January 22, 1801.

Description

Description of Mr. T. Arkwright's Machine, for raising Ore from Mines. Plate V.

A. An endless chain formed of thin plates of iron, through the ends of which plates iron bolts are passed, which keep the sides of the chain at a certain distance asunder, and on which the buckets to contain the ore are suspended.

BCDE. The buckets suspended on the iron bolts.

GHI. Three cylinders, round which the chain and buckets revolve. The two cylinders GH are placed above the shaft; the cylinder I within the mine. Their rims are so much higher than the body of the cylinders, as to admit the buckets to lie within the rims.

As the endless chain and buckets are moved forwards by a power applied to the axis of the cylinder G, the bolts of

the chain fall into notches made at regular distances in the rims of that cylinder, which preserve the chain from slipping.

As each empty bucket passes under the axis of the bottom cylinder I, it loads itself with ore instantaneously from a large box K, constantly filling by the workmen below, which box rests on two moveable pins L, at that end furthest from the wheel, and on an iron catch M at the other. The bucket thus filled ascends to the top of the cylinder G; and, in its passage betwixt the cylinders G and H, discharges its contents into a channel or receiver placed betwixt them, from whence they slide into a cart or receptacle placed underneath the inclined trough N. The empty bucket passes over the cylinder H, descends on the opposite side under the cylinder I, and loads itself again at K, as before mentioned; the buckets regularly loading and discharging themselves, whilst the cylinder G is kept in motion.

Mr. T. Arkwright's Machine for raising Ore from Mines.

Fig. 1.

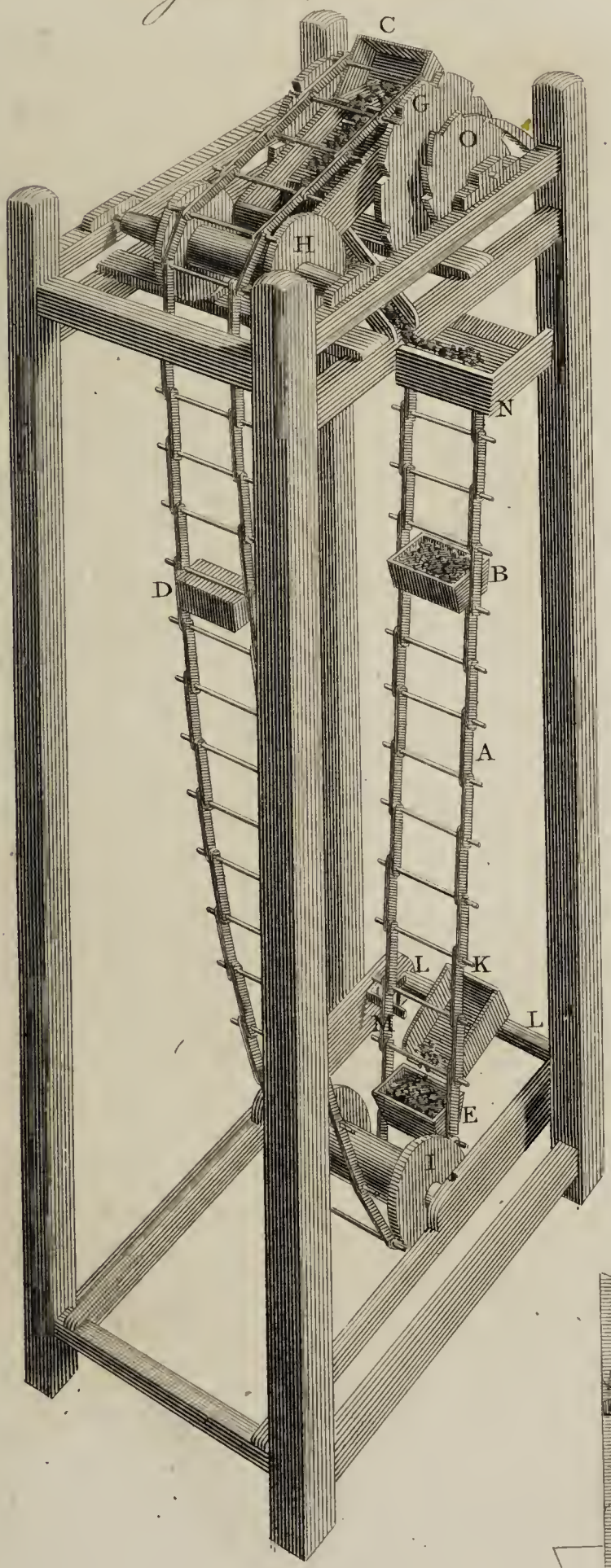
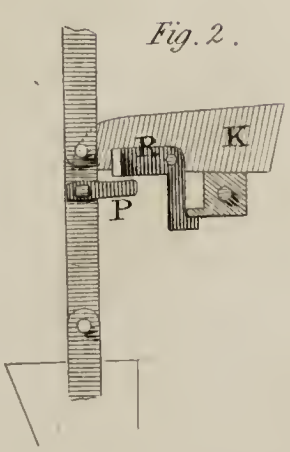


Fig. 2.



Lowry Sculp

O is a racket-wheel on the cylinder, to prevent a retrograde motion in the chain.

Fig. 2. shows, upon a larger scale, the manner in which the box K above mentioned loads the buckets. P is an iron tooth projecting from the endless chain, which, pressing upon the catch R, underneath the box K, occasions that part of the box next the chain to sink down, and discharge into the bucket beneath it a quantity of ore sufficient to fill it. As the loaded bucket rises, it lifts the box K to its former place, till the operation is repeated by the next tooth upon the chain.

*** The model remaining with the Society contains two machines put in motion by the same power, one of which is for raising ore, the other for clearing mines from water. The machine for raising ore was the object for which the Bounty was given; therefore only that part is engraved and described.

The Sum of Fifty Pounds was this Session voted, as a Bounty, to Mr. Field Evans, of Pool-Quay, Montgomeryshire, for the Discovery of a Quarry of Burr-Stone proper for Mill-stones, from whom the following Account and Certificates were received, along with a pair of Mill-stones.

SIR,

BEING informed that the Society for the Encouragement of Arts, &c. had offered a Premium to the person who should discover a quarry of stone fit for the purpose of Mill-stones, and of the same quality as French Burr-stones, and having myself discovered such a quarry, in a hill called Moel y Golfa, in the parish of Buttington, in this county, I have accordingly sent a pair of Mill-stones to the Society, before whom

whom I request you to lay my claim as soon as convenient.

I am, SIR,

Your obedient servant,

FIELD EVANS.

Pool-Quay, Montgomeryshire,
10*th May*, 1800.

Mr. CHARLES TAYLOR.

The following Certificates accompanied this letter, viz. from Mr. Henry Gardner, mill-stone manufacturer, Liverpool, dated the 1st of March last, stating, that he had manufactured into mill-stones several tons of the Moel-y-Golfa-Hill Burr-stones, and believes them to be a good substitute for French Burr.

From Elisha Williams, dated the 29th of April last, of the parish of Erbistock, in the county of Denbigh, stating, that he had used a pair of Burr mill-stones from

from Moel-y-Golfa quarry in Montgomeryshire, which he had found equal to the French Burr mill-stones, and that they would with ease grind eight measures in one hour.

From John Allport, steward to the Montgomery and Pool House of Industry, dated the 30th of April last, stating, that he had used at the Gaer-mills near Montgomery, one pair of Mill-stones from Moel-y-Golfa quarry, and that he finds them equal to the French Burr mill-stones. The above is also attested by Amb. Gettyn, and Morris Jones, Directors of the Corporation of Guardians of the Poor of the Montgomery and Pool united district, and W. Williams, miller.

From Lewis Evans, Esq. of Esgairgiliog, in the county of Montgomery, stating, that he had used a pair of Mill-stones from the Moel-y-Golfa quarry, for grinding

grinding wheat, and found them equal to the French Burrs. The said Certicate is attested by Hugh Evans, Esq. and Robert Jones, miller, on the 2d of May last.

From W. Heighway, dated Pontesford the 6th of May, 1800, stating, that he had used two pair of Mill-stones at his mills, in the county of Salop, for grinding wheat; that they came from Moel-y-Golfa quarry; and that he found them equal to the French Burrs.

From John Davies, New Mills, dated the 7th of May last, stating that the Mill-stones usually obtained on the Moel-y-Golfa Hills answer very well, and that he had used them himself.

In a letter dated the 5th of March last, Mr. Field Evans states, that the specimens of Stone which he has sent may not probably appear so porous as the French Burrs,

Burrs, the pores being in a great measure filled with a soft chalky substance, which, when worked, clears out, and is not found to injure the flour; and that the stones become harder in using. That the quarry lies in the south-west end of the hill, about 300 yards from the foot or bottom of it, the vein being in some parts three yards wide, in others not more than four feet; that it makes its appearance on the surface from south-west to north-east, from 400 to 600 yards, and then disappears on the surface for about a mile north-east, where the vein is much wider than before mentioned; that the quarry has been worked from fifteen to twenty feet deep, without any appearance of a bottom; and that there is likewise a great quantity of Burrs promiscuously in the soil, which are of a good quality, particularly on the east side.

Mr. Field Evans also, in the above-mentioned letter, furnishes a particular account

account how he discovered the said Burr-stones, in October 1797; that he noticed them in about two months afterwards to Robert Lambert, a mill-wright; and that, about June 1798, he employed Thomas Webster to make him a pair of Mill-stones from the said Burrs. He further observes, that the said Mill-stones have been almost in constant use, at Mr. Evans's mill, for about two years and a half; that he has since kept from one to three persons constantly employed in making Mill-stones from the said quarry, who have made above twenty pairs; and that he has sold four-teen pair and a half thereof, and fifty-seven ton of the stone, and has not heard any complaints respecting their quality.

A certificate, dated the 4th of March, 1801, from the Rev. William Davies, of Buttington, and Richard Williams, and Thomas Brown, churchwardens, testified

that Mr. Field Evans was the first person that discovered the quarry in Moel-y-golfa Hill, and applied the Burrs to the making of Mill-stones.

Mr. J. Probert of Powis Castle, in a note, dated the 5th of March, 1801, states, that the mountain which produces these Mill-stones, is situated on the western confines of the county of Montgomery, bordering upon Shropshire, about a mile and a half distant from the river Severn, by means whereof they may be sent to Bristol, as well as to the interior parts of the kingdom, along the canal joining the Severn with the Thames; that the Montgomeryshire Canal branches out of that of Ellesmere, along which they may be conveyed to Chester, Liverpool, &c.

The

The SILVER MEDAL was this Session adjudged to Mr. GARNET TERRY, of the City-Road, Finsbury-Square, for an improved MILL FOR GRINDING HARD SUBSTANCES; a Plate and Description of which are annexed, and a complete Model reserved in the Society's Repository.

SIR,

I HAVE taken the liberty of sending, for the inspection of the Society for the Encouragement of Arts, &c. a small Mill calculated for the purpose of grinding hard Substances.

I have made one on a large scale, and find it answers the purpose of reducing to powder, Coffee, Bones, Ashes, and other such things: it has also been tried, and found effectual and expeditious, in breaking down Beans, Peas, Malt, Barley, &c. If it is worth the notice of the Public,

Public, I beg you will make such use of it as the Society may think proper.

I am, with respect,

SIR,

Your humble servant,

GARNET TERRY.

N° 20, *City Road, Finsbury-square,*
March 3, 1801.

Mr. CHARLES TAYLOR.

Description of Mr. Garnet Terry's Mill.
Plate VI. Fig. 1.

A. The hopper, or receptacle of the articles which are intended to be ground.

B. A spiral wire, in the form of a reversed cone, to regulate the delivery of them.

C. An inclined iron plate, hung upon a pin on its higher end: the lower

lower end rests on the grooved axis D, and agitates the wire B.

D. The grooved axis, or grinding cylinder, which acts against the channelled iron plate E.

F. A screw on the side of the mill, by means of which the iron plate E is brought nearer to or removed further from the axis D, according as the article is wanted finer or coarser.

G. The handle, by which motion is given to the axis.

H. The tube from whence the articles, when ground, are received.

*** The front of the mill is taken off, in order to show its interior construction.

A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. WILLIAM BULLOCK, of Portland-street, for an improved DRAWBACK LOCK for House-Doors; a Plate and Description of which are hereunto annexed, and a complete Lock reserved in the Society's Repository.

SIR,

I HAVE herewith sent, for the inspection of the Society, an improved Drawback Lock for House Doors, &c. which improvement is in latching the door; for it is well known, particularly in damp weather, that the air drawing through it, rusts the head or bevel of the bolt, by which means it requires great force to shut the door, and occasions a disagreeable noise, besides shaking the building.

It has frequently happened that the house has been exposed to robbery from the

the door being left unlatched, when supposed to be fast. This improvement removes all those inconveniences, as it lets the bolt shoot into the staple immediately when the door closes, but not before; and the reliever works so very easy, that the door is made fast with one twenty-fourth part of the force required with locks upon the common construction.

By an experiment with the Lock sent herewith, it will be proved that two ounces added to the reliever, will shoot the Lock with more ease than three pounds will do, applied to the bevel bolt; and if the lock is rusty, the advantage will be much more in favour of the new method. I flatter myself it will be of great utility to the public, as its construction is simple and cheap. It may be added to any old lock, as may be seen from that now sent. It may be advantageously applied to French windows and glass doors, as it prevents the

door from being strained, or the glass broke, by the force applied to shut them. I have fixed several Locks, upon this new principle, which answer well; and if the invention meets with the approbation of the Society, I hope to be rewarded according to its merit.

I remain, with respect,

SIR,

Your most obedient servant,

WILLIAM BULLOCK.

N° 6, *Portland-street, Soho,*
May 5, 1801.

Mr. CHARLES TAYLOR.

Mr. Garnet Terry's Mill.

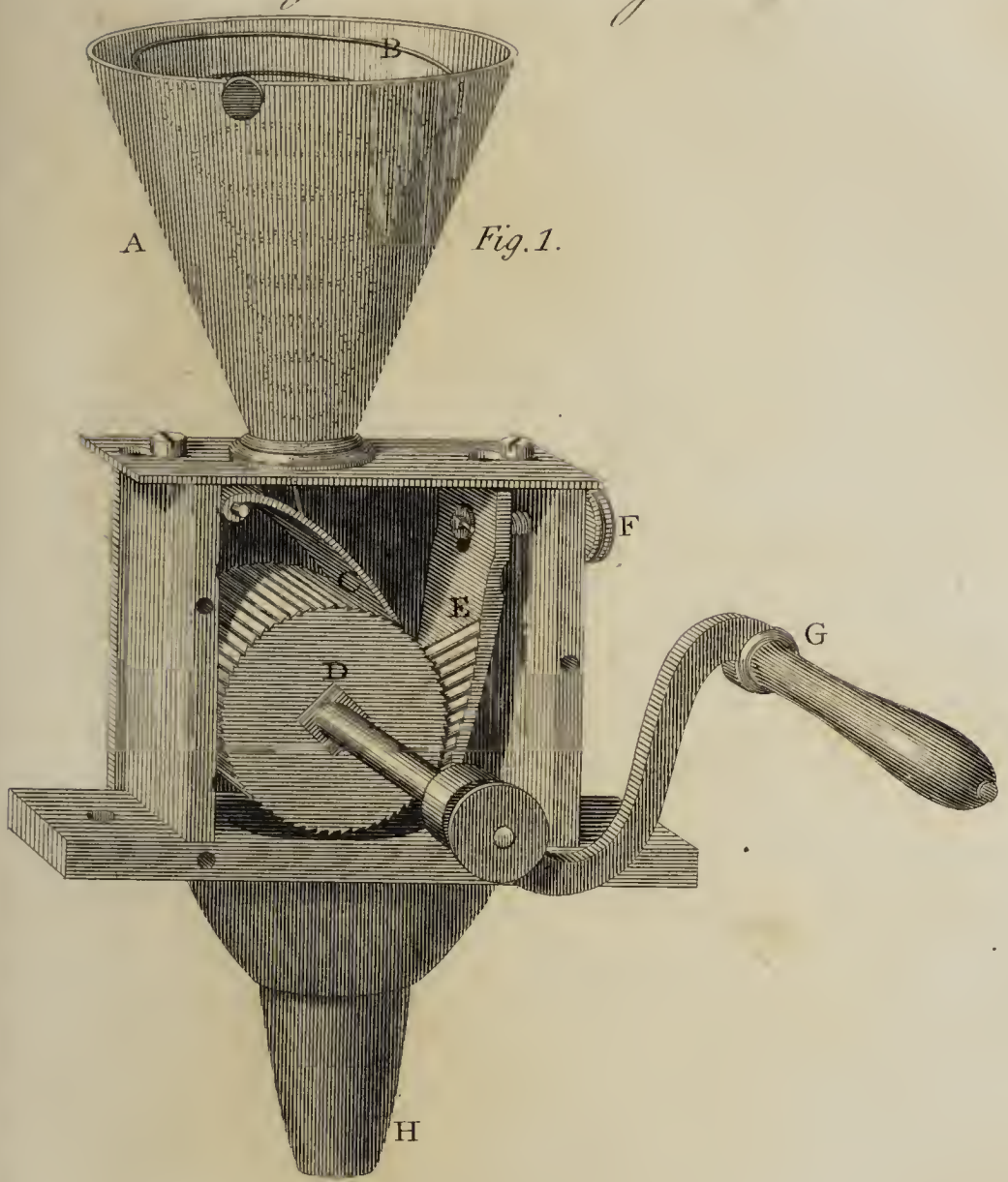


Fig. 1.

Mr. Bullock's Drawback Lock.

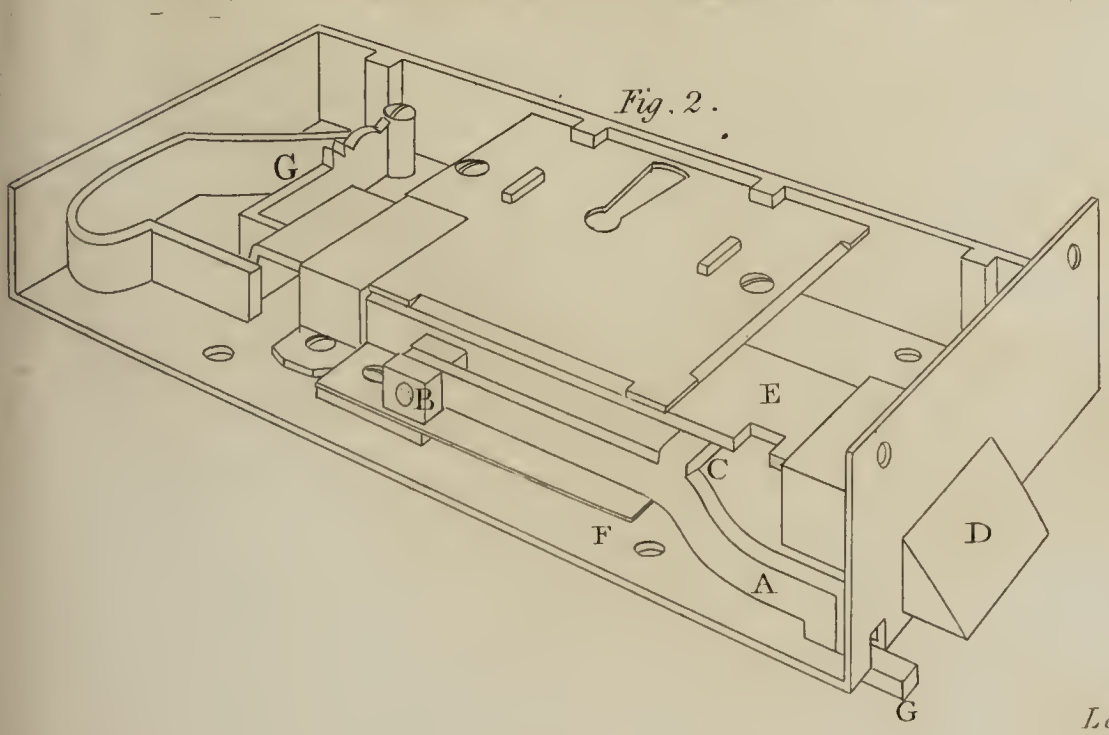


Fig. 2.

Lowry Sculp.

Description of Mr. William Bullock's improved Drawback Lock. Plate VI. Fig. 2.

A. Is the new iron latch here affixed to an old common drawback house lock.

B. An iron pin at one end of the latch, on which pin it is moveable.

C. A projecting part of the latch, which, when the common spring bolt D of the lock is drawn back, in the usual manner, is forced into the nick on its higher part at E, by the spring F, underneath the latch. The bolt D then remains within the lock, until, on closing the door, the reliever G gently presses on the lock box, fixed in the common way on the door cheek; which pressure draws the projecting part C out of the nick E, and permits the end of the bolt D, by the force of the spring G, to slide into the lock box, and fasten the door.

The Sum of FIFTEEN GUINEAS was this Session voted as a Bounty to Mr. THOMAS GENT, of Homerton, for a new-invented CRANE, for raising and delivering heavy Bodies. A Plate and Description are annexed, and a Model of the Machine may be seen in the Society's Repository.

SIR,

AN offer of encouragement being published by the Society, to any person producing a model of an improved Machine for drawing up Ore, &c. from mines and pits; I beg leave to submit to your consideration a model of a Crane, which I hope will answer for that purpose; also for sinking Wells, clearing Canals, and raising Casks or other heavy Weights out of Cellars. I flatter myself that a Machine on the principle of this model, is calculated better

better for this purpose than any I have seen, it having a two-fold principle, viz. first, that of making a perpendicular draft, and discharging the load at the same time (without any intermediate space); and, secondly, raising the same a sufficient height, so as to place the article in a cart, or other carriage, for conveyance. I leave the merit of the plan to the judgment of the Society, and shall be pleased with such encouragement as they may award.

I am, SIR,

Your obedient humble servant,

THOMAS GENT.

N° 5, *Lower Terrace, Homerton,*
April 14, 1801.

Mr. CHARLES TAYLOR.

Description of Mr. Thomas Gent's Crane.
Plate VII. Fig. 1 and 2.

A. The crane, three feet in length from the centre B.

B. The centre, upon which it turns under the cross-beam.

C. The quadrant, two feet eight inches in length from the centre B.

D, A chain, which works upon the quadrant, and communicates with the roller E, on which is a toothed wheel put in motion by a small pinion on the axis of the winch-handle F.

G. A rope, which passes over the pulley H at the end of the crane. The weight to be raised is fastened to the block I, and is lifted up by the other end of the rope winding round the roller K.

K. Is a roller, on which a toothed wheel is placed, and worked by a pinion fixed on the axis L, moved by the handle M.

NN. Are catches, which are slided occasionally into the teeth of the wheels on the rollers, to keep them stationary.

O. The cross-beam of the machine, from which the crane is suspended underneath.

PP. Two upright posts, which support the cross-beam.

When a weight is to be lifted from within the shaft of a mine, over which the machine is to be placed, the pulley H should be drawn down, and the point of the quadrant C raised upright in a perpendicular line; then, by working the handle M, the weight is raised from within the shaft, until it clears the surface of the ground, at which period, by turning the handle F, the point of the

quadrant

quadrant C is brought gradually into an horizontal line, which projects the crane and weight so far from the shaft, as to allow a cart to be placed underneath to convey the article which has been thus raised.

Fig. 2. shews the method by which the chain is connected with the roller.

D. The same chain as in the former figure, but in a different point of view.

E. The roller mentioned in the former figure.

SS. A double cord, the two extremities of which are fastened at TV to the roller E, and joined to the lower end of the chain at W: this double cord serves to keep the chain regularly in the centre of the quadrant.

The

Mr. Tho.s Gent's Crane.

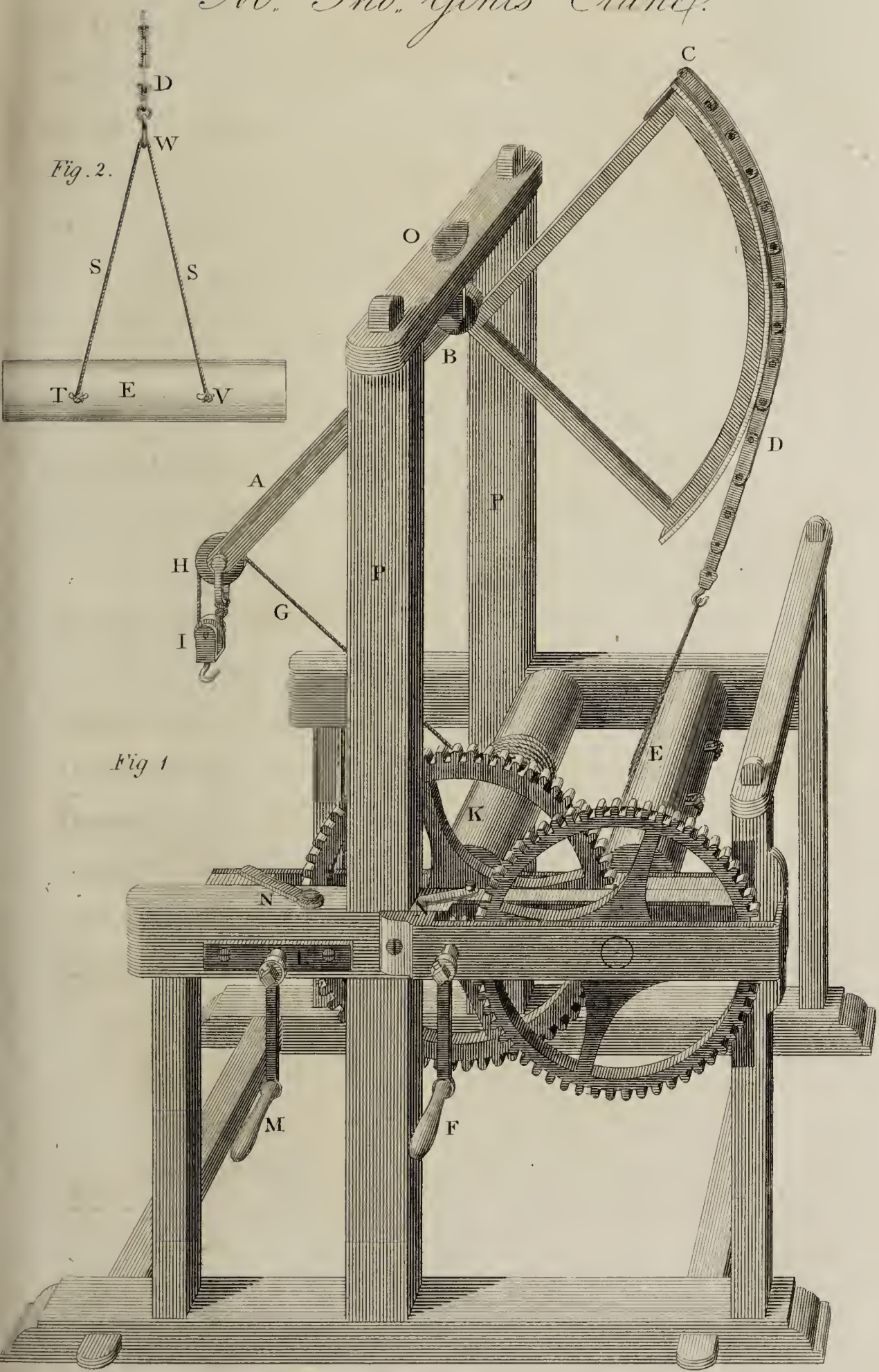


Fig. 2.

Fig 1

Lowry Sculp.

The Thanks of the Society were this Session voted to Sir George Onesiphorus Paul, Baronet, of Grosvenor-Street, for the following valuable Communication of the method invented by him, and used under his direction, for the Ventilation of Hospitals, &c. Actuated by his usual philanthropy, he has also presented to the Society Models of the Machinery he employed, and which are reserved in the Society's Repository, for public inspection. Engravings and a Description of them are hereunto annexed.

SIR,

I HAVE been favoured with your letter, stating the terms of a Premium offered by the Society of Arts, &c. for "A Mode of permanently ventilating the Apartments in Hospitals, Gaols, and other

other crowded places, superior to any now known or used;" and that the Society had done me the honour " to direct you to express their wish to receive from me communications on this subject."

I not only agree with the Society, that " the subject is important to the health of persons destined to inhabit such places" as are specifically mentioned in the proposal for the Premium; but I also believe that the morbid effects of impure air are felt in all situations of life where education, business, or social intercourse, may aggregate mankind.

From observations made during a pursuit which of late years may be said to be habitual to me, I fear I must *also* admit that Ventilation is improperly performed, by the means now generally employed,—where those means act on persons in a sickly or convalescent state, or accustomed to delicate habits of life.

The

The transverse passage of outward air, through a room (which I shall term free Ventilation), is no *doubtful* mode of obtaining vital air; yet, certainly, if the attendant consequences render such a mode inadmissible (to an efficient degree) in the abodes of sickness or infirmity, the Society are justified in considering the subject as open to much further improvement.

Desiring to be understood as not addressing the Society as a claimant of their Premium; I conceive I may assist them in the pursuit of their laudable purpose, by submitting to their perusal some practical observations on the modes of Ventilation hitherto practised, and by communicating the outline of a design already conceived, and in a limited degree adopted, for correcting their admitted imperfections.

It may be necessary to premise, that the peculiar enquiry, the result of which will be detailed in the following pages, was

was excited by some objections, originating in a most respectable quarter, and directed against a system, on which I had heretofore *solely* depended, in providing for the Ventilation of such public establishments as have been placed more particularly under my direction.

It may be inferred from the note annexed to the proposed Premium, that similar objections are entertained by the Society: I shall therefore, as you requested, submit my observations, without that delay which would necessarily be occasioned by my modelling them in conformity to the rules you have communicated, and waiting for certificates to accompany them. If there really does not exist a doubt as to principle or fact, on a question so important, should not that doubt be made the subject of a previous special consideration, so that a point of direction may be given to the mechanical exertions intended to be excited?

Although

Although particular conclusions may be controverted, I may venture to assume as the basis of all observations on this subject,

First,—That a certain and frequently renewed supply of vital air is essential to the purposes of animal life; and the more regular and uninterrupted that supply, the more favourable will it be to health.

Secondly,—That where the quantity of atmospheric air introduced into an apartment, is less than nature has bestowed in free circulation, her purpose is in a degree counteracted; and although the breathing impure air (*i. e.* air despoiled of its natural proportion of vital air) for a short time may not produce an immediate sensible effect, an injury may arise to the constitution, proportionate to the extent of that time. And further, when (as in the ordinary intercourses of society in London) persons are in the habit of placing themselves

selves, during a considerable portion of every twenty-four hours, in a situation to breathe in this defective atmosphere, the accumulated consequences may be serious and important.

Thirdly,—That in rooms from which currents of fresh air may not be excluded, they may be so injudiciously directed as to be useless and injurious. And,

Fourthly,—That if, in addition to the consumption of vital air by the lungs, the persons of those assembled in any apartment should be filthy,—should their clothing (particularly that made of woollen) have been so long worn as to have absorbed any considerable portion of the perspiration of the body,—or should the apartment itself be damp and foul, the vital properties of the air will be contaminated, and although instant death may not ensue (which has been known to be a consequence), the fevers emphatically termed the Gaol, Hospital,

or Ship Fever, from its usually originating in these places, will be generated with a degree of malignancy proportionate to its causes, and, being so generated, will become infectious with a like degree of malignancy.

It is about twenty years since the deleterious consequences of inattention to Ventilation were set forth by Mr. Howard. So strong and so general was the conviction of the public mind, not only as to the evil pointed out, but regarding the remedies proposed by that indefatigable philanthropist, that the Legislature thought fit to adopt the whole of his principles, and to make them the basis of several positive laws, under the direction of which the greater number of prisons of the kingdom have since been reconstructed, and the remainder (with few exceptions) altered in conformity to the principle recommended by him, namely, *that of introducing cur-*

rents of fresh air INTO *and* THROUGH *every apartment.*

In these prisons, where attention is also paid to personal cleanliness, I venture to say, the Gaol Fever is unknown, unless brought into them by prisoners committed in a state of previous infection.

By equal exertion on the like principles, the healthiness of the ships of war has been so improved, that they are no longer sources of this desolating pestilence.

Regarding hospitals, I fear it cannot be proved that a relief so complete has been effected. Mr. Howard was not sparing in his strictures on the management of this important branch of our public institutions; but the improvement he suggested went no farther than simply the introduction of fresh air. The reconciling this advantage with that generally diffused warmth, necessary in

sick

sick rooms, seems to have escaped his contemplation.

Of the several hospitals constructed since his observations were made public, most have been planned with a view to facilitate the passage of outward air through the wards. The Directors of old hospitals have adopted alterations more or less tending to the same purpose; but all seem to have rested at this point: yet, considering the importance of pure air to patients, during the tedious cure of compound fractures, and other accidents or diseases, together with the no less important object of securing them from currents of cold air, it cannot be denied that much still remains to be effected.

In the construction of the larger Workhouses, termed Hundred-houses, similar principles of Ventilation have been attended to with evident success, in preserving the health of the inhabitants; but with respect to Parish Workhouses

on the *lesser* scale—School-rooms (both for boys and girls in every rank of life), Manufactories—Apartments for Public Lectures—and Ladies Assembly-rooms—these, together with the circumscribed Cottages of the Poor, remain in a state most dangerous to health from imperfect Ventilation. To these sources, and to no other, may be traced the few putrid and contagious diseases which occasionally show themselves amongst us; and which, to the credit of *free Ventilation*, can no longer justly be called Gaol or Ship Fever.

At a period of demonstrated success of the doctrine recommended by Mr. Howard, and adopted by his disciples, the valuable essays and experiments of Count Rumford appeared before the public: whilst opening to the world a new and most useful system of domestic philosophy, he has advanced opinions unfavourable to those means by which these important effects have been produced.

In

In theory this ingenious philosopher and friend of mankind has decidedly negatived the necessity and questioned the propriety of Ventilation, by the admission of currents of air. In the construction of those buildings most immediately under his direction, he has certainly adopted a *practice* of a direct opposite tendency.

Opinions of such authority could not fail to be respected: they must at least raise a doubt in the mind of the most confident advocate of an opposite theory.

As the Count's observations and practice tended to invalidate a material part of that system, in the pursuit of which immense sums had been *confidently* expended in the kingdom, and respecting which I bear more than a common share of responsibility, I felt myself peculiarly called upon to scrutinize his objections, and to obviate such as should appear to be denied by experience; but, at the same time, certainly to

abandon whatever ground could not be fairly maintained by a result.

As my conclusions on the point disputed are formed on circumstantial observations made within a Prison and Hospital immediately under my own eye, and as these particular institutions have not unfrequently been resorted to as examples for imitation, a detailed reasoning regarding them may serve for general application.

The County Gaol at Gloucester is constructed on the principles of admitting air to pass into and through it in strait lines, from one extremity to the other. There is no obstruction to a freedom of current, other than as the streams of air passing through the long passages, open at each end, move with the greater velocity, they of necessity carry with them the weaker currents, passing into and through the cells at right angles.

From

From the time this prison was opened in 1791, until the year 1800, about 1300 persons were committed to it; and, on the average, about one hundred prisoners were constantly confined in it. In these nine years the number of deaths has been thirteen; and of these, four sunk under the effects of disease brought into prisons with them. During the last year, the prison has been crowded in an uncommon and very improper degree: two hundred and fourteen have been confined; and the average number has been one hundred and sixty-seven. One prisoner only has died (a woman aged sixty) in the month of October last. At the opening of the Spring Assizes, 1801, (the time of the greatest numbers) there was not one prisoner sick, or in the hospital ward.

By this statement it appears, that the proportion of deaths is so much below the common average, in the ordinary situations of life, that the healthiness of

this abode may be said to be peculiar; and it is in proof, that however currents of air may be found injurious to particular constitutions, they are not unfavourable to general health.

Every prisoner in this gaol, when not in the infirmary-ward, sleeps in a room containing from fifty-two to fifty-seven feet of superficial space, built with brick, resting on an arch, and arched over; so that no air can enter it but through the openness provided for it. As air is constantly passing immediately under it, and round it on every side, it is necessarily dry: it is ventilated by opposite openings near the crown of the arch. To that opening which is towards the outward air, there is a shutter, which the occupant may close at will; but it is so imperfectly fitted, that, when closed, a considerable portion of air must enter by its sides. The opposite opening to the passage, the prisoner has no means of closing in any degree.

During

During the ten years these rooms have been inhabited, there have been three winters in which the cold has been intense. As I had considerable apprehensions of the effects of this situation in severe weather, I directed the surgeon of the gaol to be constant in his attention; and particularly in the report of his observations during the inclemency of these seasons. I also made a point frequently to visit the prison, and to examine every prisoner as to the effects apprehended; and, as much to my surprise as to my satisfaction, notwithstanding the querulous disposition of persons in their situation, I never heard a complaint from old or young, from male or female, suffering by cold in the night apartments.* And further, it is the

* Fahrenheit's thermometer has never been observed to be below 33° in the severest nights, in the middle region of a cell in which a prisoner was sleeping; whereas, in the ordinary apartments of a dwelling-house, water is frequently known to freeze by a bed-side.

the decided opinion of the two able physicians who have most liberally undertaken to superintend the health of this prison, that no ill consequences have arisen from prisoners sleeping in the situation above described.

I must contend, therefore, it is a fact established by experience, that in a room containing not more than from 415 to 439 cubical feet of air, in which there is no fire, the body of a person sleeping under a proper allowance of woollen bed-clothes will so far warm the atmosphere around him, or to speak more conformable to modern doctrine, so little of the heat generated in the body will be carried off by the surrounding air, that he will not suffer by a current * passing at a distance over him, provided the apartment be secured from damp.

On

* The term "current" is not to be understood in a stronger sense than merely to signify that species of circulation of air, which is directed in strait lines from point to point, by the action of any efficient cause.

On the points, therefore, of warmth and Ventilation *combined* it must surely be allowed (regarding rooms so constructed) there is no farther *desideratum*.

Prisoners, on their rising in the morning, are removed into small working-rooms or wards situated on the ground-floor. These day apartments are, in like manner, constructed with cross openings near the ceiling or crown of the arch; but there is also in each of them an open fire-place. Respecting these apartments, my observations tend to *confirm* Count Rumford's objection to open fires, and his preference to closed stoves. Nay, farther, I am disposed to admit, that openings for free Ventilation are incompatible with strong fires in open fire-places.

It is certain that, in rooms so provided, the danger arising from impure air is completely guarded against; yet this advantage is gained at the risk of another

another evil, which, though not so important, should, if possible, be avoided.

The air which in the same room without an open fire-place would pass inwards by one opening, and outwards by the other, being attracted by the fire to supply the constant rarefaction in the chimney, passes inwards from both openings towards the fire place, and the body of a person placed near it, being in its current, is exposed to the danger of partial chill. To this circumstance, in these apartments, I am inclined to attribute the few complaints of a dysentery or aguish tendency, which have occasionally interrupted the general health of this prison.

In the hospital, the scene of my observations, the morbid effects of foul air in the wards have, until lately, been no otherwise relieved than,

First,—By introducing currents of fresh air by the windows, with an improved

proved mode of hanging the upper sash, peculiar to this hospital, by the effect of which the current of air admitted is turned upwards to the ceiling, and prevented from descending on the patients, whose beds are placed under the windows;

Secondly,—By piercing holes in the ceiling of the wards, and by means of plaistered channels or wood funnels, leading the foul air, rising into them, to the roof.

In warm weather, when the doors of the wards are open, and the fires low, these channels or funnels operate with considerable effect. Much foul air will by its relative specific lightness (not being counteracted by a stronger power), ascend them and escape; a further portion will pass off by the windows opening to the leeward, and Ventilation may be duly effected.

But, on the contrary, when the doors are shut, and strong fires are made, these

these will inevitably attract the currents of air *inwards* and towards them, from all the openings; and should patients be situated in their course, the effect cannot fail to be injurious.

Besides, as the windows are generally closed in the night (the most important time for Ventilation), no other change of air takes place, but what is effected by the open fires, which, whilst supplied immediately from the middle region, are constantly consuming the best air of the room.

Hence it appears that free Ventilation, or the transverse passage of outward air, may be inconsistent with the general warmth required in the apartments of the sick; and that channels for the escape of foul air, unassisted by a power more constant and decisive than the relative specific lightness of that air, is a mean inefficient to preserving a healthful respiration in the crowded wards of an hospital.

As

As a remedy to these apparent defects in the ordinary mode of Ventilation, it has been imagined that the draft, or determination of the air, to the funnels in the ceiling of the rooms requiring Ventilation, is accelerated by the operation of fire; and by causing an increased degree of rarefaction, at the termination of the funnel, to discharge the air rising to the ceiling in a degree depending on the correct application of the apparatus and quantity of fuel consumed.

In all rooms or apartments requiring Ventilation, it is presumed that (according to the old system) channels or funnels are provided for the discharge of air ascending into them. These channels or funnels, so provided, should be rendered air-tight, and brought to terminate immediately under the fire intended to work them. The ash-pit and fire-place should be so closed, by doors, as to prevent the fire from drawing the

the air from the room surrounding it. The whole draft or consumption occasioned by the fire will then be supplied from the further termination of the channel or funnel.

This effect may be applied according to circumstances, either to the ceiling of the room in which the fire is made, to the room below, or to that above it; and draught thus produced may, by a proper apparatus, be increased or diminished at will.

In the hospital in which I have made the first experiment of this design, I have caused a stove to be so formed as to answer the culinary purposes of the ward in which it is fixed, and at the same time to ventilate the ward beneath it; and no additional expense is created in fuel by the operation.

By a fire made in one of these stoves, a ward beneath it, containing about 18,000 cubical feet, filled with patients (and which, in spite of all former means,

was

was ever remarkably offensive) was in a few minutes so relieved of contaminated air, as to be sensibly felt by all the patients in it, without their perceiving any increased current.

The principle of the means of Ventilation adopted in this hospital may be be applied with perfect facility to ships.

By carrying the funnel from a cabin or ship stove, of any kind or dimension (observing *only* to exclude the admission of surrounding air), to the hold or under-decks, they may be as completely ventilated as the wards of an infirmary. In stormy weather, when the decks of a ship must of necessity be closed, the fires would perform a service which could no otherwise be attained; whilst, by the nature of the apparatus, the fire itself would be secured from the effects of the wind.

If the stove or grate over a lady's drawing-room were properly fitted to this purpose, on the evening of her assembly,

it might be set in action, and the room beneath cleared of its impure air, without recourse being had to the openings of windows: the openings in the ceiling might be rendered ornamental.

By applying the same principle to German or other closed stoves, the chief objection to their use in crowded rooms would be obviated; and I should then agree with Count Rumford, that in all rooms, where the indulgence of the habit of open fires was not in question, such stoves (if constructed of earthen materials) would afford a more "genial warmth," and a "due circulation be at the same time effected."

So fitted and constructed, they would be incontestably better than open fires for the wards of Hospitals, Poor-houses, Manufactories, Theatres for Lectures, School-rooms, and Prisons. Respecting the last-mentioned structures, I must further observe, that if public Kitchens

were

a sutler appointed, under due regulations, the present necessity of open fires for prisoners to cook individually for themselves, would be superseded much to their advantage.

On the other hand, I must also observe, that if closed stoves, acting on this principle, were adopted, Count Rumford's objections to the introduction of fresh air would be obviated, with regard to any room in which they should be in action, provided the opening through which it entered was made on a level with the ceiling.

Air entering at this level would, in the absence of open fires, be acted upon by no other draft than the mouth of the funnel in the ceiling, and could not descend in currents to the lower region of the room.

In a room so filled with company as to vitiate the air within it, the atmospheric air entering, being specifically heavier, would indeed descend, and be replaced

by the ascending impure air; but, as it would not descend by a stronger impulse than its difference of specific weight, it must be slow in its motion, and would produce no sensible current.

Should the above observations and conclusions be thought worthy attention, I shall, with great pleasure, direct Models of the improved Hospital-Sashes, and of the Stoves for accelerating Ventilation by the action of fire, to be made for the use of the Society.

I am,

Your very obedient servant,

G. O. PAUL.

Grosvenor-Street,
May 30, 1801.

CHARLES TAYLOR, Esq.
Secretary to the Society of Arts, &c. *Adelphi.*

A perspective View of Sir G. O. Paul's Stove, for ventilating the Wards of Hospitals.

Plate VIII. Fig. 1.

A A. A chimney-piece, of ordinary dimensions.

B. A Bath-stove, made to fit the chimney: the hobbs of which, NN, project two inches and a half before the fire-grate.

C C. Folding-doors to close the fronts of the ash-pit, and to fall back against the hobbs.

D D. Folding-doors to close the front of the fire-grate, and to fall back against the hobbs.

E. A door to close the top of the fire-grate, when a very strong draught is required. When put down, the smoke is directed through the open space H, and the door is used as a hot table for

culinary purposes; when open, it serves as a chimney back.

F. A flat bar projecting two inches and a half before the fire-grate as a stop to the upper and lower doors.

G G. Holes left in the castings of the ash-pit, to receive the mouths of air-tunnels in the back, or on either side, as circumstances may require.

H. The opening to the back flue, used as a passage for the smoke, when the top door is closed on the fire-grate.

I I. A double register:—first, to close the back flue when the fire-grate is open; secondly, to close the front flue when the back draught is necessary; and, thirdly, to prevent the heat being carried up the chimney.

Fig. 2. A back view of the ventilating stove, on which similar letters are

are marked as denote the same parts already mentioned in *Fig.* 1.

K K. Are shoulders for tunnels cast with the ash-pit, fixed at the openings G G, mentioned in *Fig.* 1.

N. B. There should be doors or regulators to the mouths of the air-tunnels K K, to close them when the doors of the stove are open, otherwise (there being at that time little or no draught by the tunnels towards the fire), the dust will pass by them into the rooms with which they communicate.

L L. Air-tunnels are to be fixed on the shoulders K K, and to be prolonged in any direction required, either downwards to any room below, which wants ventilating, or upwards to the ceiling of the room in which the fire is made, or

to any rooms above it requiring ventilation.

N. B. The direction of the first length or piece of the tunnel should, in all cases, be upwards, to prevent sparks of fire, which may fly into it, being conveyed into a room ventilated by a descending tunnel.

The tunnel should, at least, rise so far that the lower edge of it may be higher than the upper edge of the shoulder on which it is fixed.

M. A back flue to conduct the smoke when all the doors are closed, and the stove made to act with its utmost force.

N N. The hobbs on each side the fireplace.

Fig. 3. A side view of the ventilating stove, in which the letters correspond as before.

Fig.

Fig. 4. A view from above of the two chimneys which convey away the smoke, and of the register which closes one or other of them, as occasion may require.

Description of the Sash-Window for an Hospital. Plate VIII. Fig. 5.

aaaa. A common sash-window frame, the upper extremity of which should be level with the ceiling of the room.

b. The lower sash fixed.

c. The upper sash working inwards on the pivots *e e*, at each side of its lower end.

d d. Inclined edges fixed, with a proper inclination inwards, on the jambs to which the sash is fitted. These jambs and ledges should be made as exactly as possible to fit the sash in its working, to prevent air from passing inwards by its sides.

e e.

e e. The pivots on which the upper sash-frames move.

f. A regulator, notched on its lower part, and moving in a groove *g*. At the extremity of the regulator is a loop or ring *h*, to receive a hook fixed to a long pole, by which the sash may be worked by the apothecary or nurse. The notches in the regulator resting on the groove, admit the sash to be placed at any intermediate distance required.

The pole may be afterwards removed out of the reach of the patients.

Fig. 1.

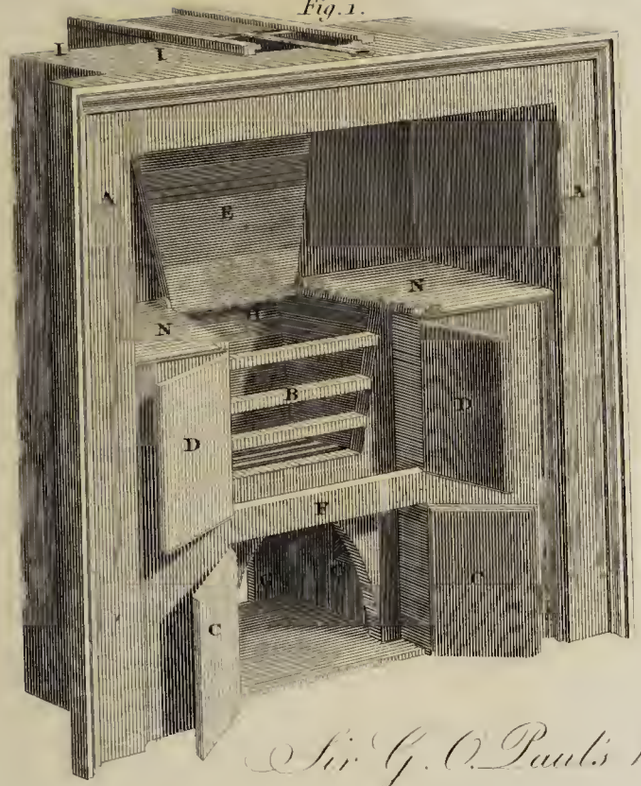


Fig. 3.

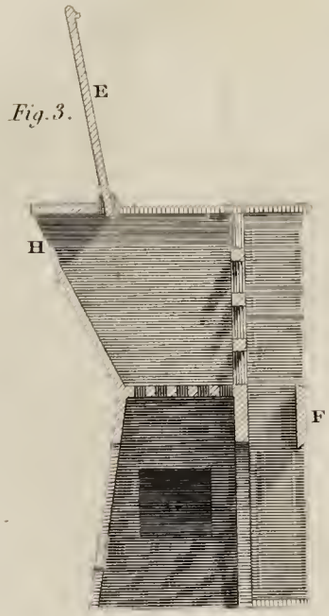
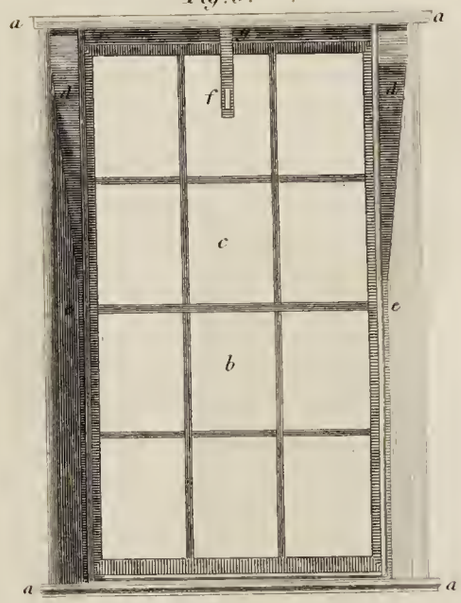


Fig. 5.



Sir G. O. Paul's Ventilating Stove & Sash Window for Hospitals.

Fig. 2.

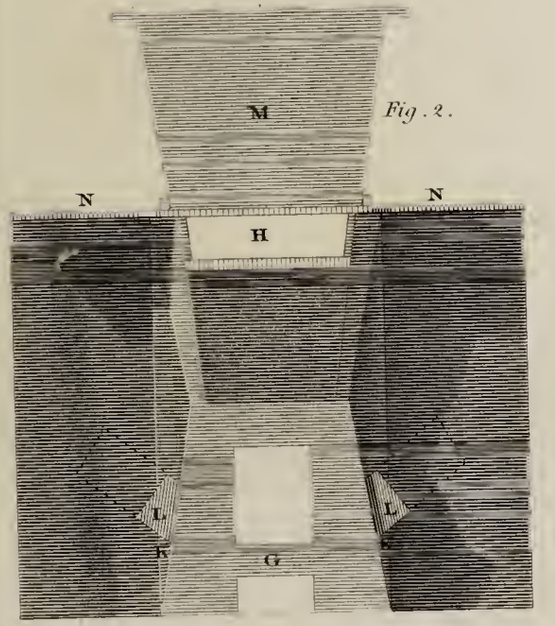


Fig. 4.

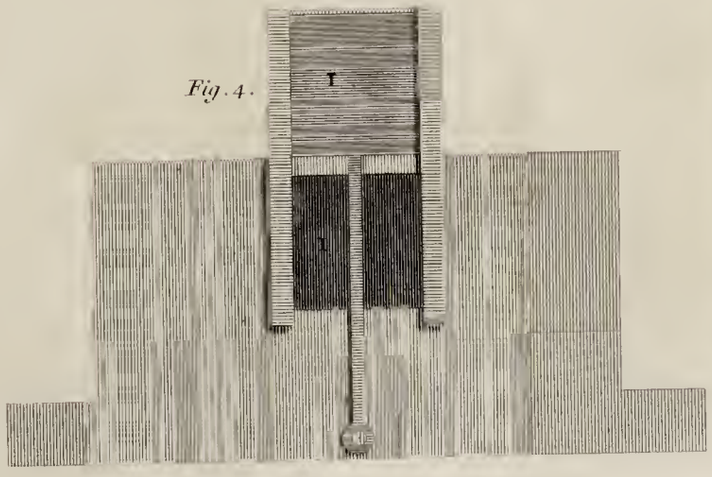
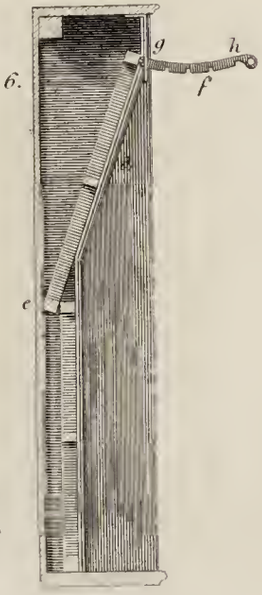


Fig. 6.



Lowry sculp.

A Bounty of THIRTY GUINEAS was this Session voted to Mr. JOHN DE LAFONS, for his communication of a new ESCAPEMENT for WATCHES, a Plate and Description of which are hereunto annexed, and a complete Model reserved in the Society's Repository for the inspection and use of the Public.

SIR,

HAVING considered the perfection of Chronometers to consist more in giving an equal impulse to the balance than to any other general cause, I present, in hopes of the approbation of the Society, the model of a new Escapement, which has not only the property of correcting the errors of the main-spring, train of wheels, &c. and giving an equal power to the balance, but likewise the wheels are locked, without spring-work,

perfectly

perfectly safe from getting out of order, and are unlocked with less power than in any Escapement I know, as the wheels do not bear against the locking with more than a tenth part of the whole pressure from the main-spring; a circumstance I believe to be perfectly new.

Although the giving an equal impulse to the balance has been already most ingeniously done by Mr. Mudge, and by Mr. Haley (from whose great merit I would not wish to detract), yet the extreme difficulty and expense attending the first, and the very compound locking of the second, render them far from completing the desired perfection. Presuming I have simplified the above ideas, I leave it to the Society's judgment to determine the merit of mine.

I am, Sir,

Your obedient servant,

John De Lafons.

April 13, 1801.

Mr. Charles Taylor.

Observations on, and Description of, an improved Escapement. Plate IX. Fig. 1, 2, 3, 4, 5.

HIGHLY flattered by the honourable patronage my mechanical attempt has received, after returning my most ardent thanks for the favour of the great attention paid by the Gentlemen of the Committee, I feel it incumbent on me to point out the perfections and advantages arising from my improvements on the Remontoire detached Escapement for Chronometers, which gives a perfectly equal impulse to the balance, and not only entirely removes whatever irregularities arise from the different states of fluidity in the oil, from the train of wheels, or from the main-spring, but does it in a simpler way than any with which I am acquainted. I trust it will not be thought improper in me to answer some objections made at the examination before

before the Committee, as I am fully persuaded the more mathematically and critically the improvements are investigated, the more perfect they will prove to be.

It was first observed, that my method did not so completely detach the train of wheels from the balance as another Escapement then referred to. I beg leave to remark, that the train of wheels in mine is prevented from pressing against the locking, by the whole power of the remontoire-spring; so that the balance has only to remove the small remaining pressure, which does away that objection, and also that of the disadvantage of detents, as this locking may be compared to a light balance turning on fine pivots, without a pendulum-spring; and has not only the advantage of banking safe at two turns of the balance, and of being firmer and less liable to be out of repair than any locking where spring work is used, but likewise

likewise of unlocking with much less power.—It was then observed, it required more power to make it go than usual. Permit me to say, it requires no more power than any other Remontoire Escapement, as the power is applied in the most mechanical manner possible.—And lastly, it was said, that it set or required the balance to vibrate an unusually large arch before the piece would go. This depends on the accuracy of the execution, the proportionate diameter and weight of the balance, the strength of the remontoire-spring, and the length of the pallets. If these circumstances are well attended to, it will set but little more than the most generally detached Escapements.

I proceed

I proceed to describe mine as follows:

A. The scape-wheel.

B. The lever pallet, on an arbor with fine pivots, having at the lower end

C. The remontoire or spiral spring fixed with a collar and stud, as pendulum-springs are.

D. The pallet of the verge, having a roller turning in small pivots for the lever pallet to act against.

E. Pallets to discharge the locking, with a roller between, as in *Fig.* 4.

F. The arm of the locking pallets continued at the other end to make it poise, having studs and screws to adjust and bank the quantity of motion.

a & *b*. The locking pallets, being portions of circles, fastened on an arbor turning on fine pivots.

G. The triple fork, at the end of the arm of the locking pallets.

The

The centre of the lever-pallet in the draft, is in a right line between the centre of the scape-wheel and the centre of the verge, though in the model it is not; but may be made so or not, as best suits the calliper, &c.

The scape-wheel A, with the tooth 1, is acting on the lever-pallet B, and has wound up the spring C; the verge-pallet D (turning the way represented by the arrow) the moment it comes within the reach of the lever-pallet, the discharging-pallet E, taking hold of one prong of the fork, removes the arm F, and relieves the tooth 3 from the convex part of the lock *a*. The wheel goes forward a little, just sufficient to permit the lever-pallet to pass, while the other end gives the impulse to the balance: the tooth 4 of the wheel is then locked on the concave side of the lock *b*, and the lever-pallet is stopped against the tooth 5, as in *Fig.* 3. So far the operation of giving the impulse, in order again to

wind the remontoire-spring (the other pallet at E, in the return, removing the arm F the contrary direction), relieves the tooth 3 from the lock *b*. The wheel again goes forward, almost the whole space, from tooth to tooth, winds the spiral-spring again, and comes into the situation of *Fig.* 1. and thus the whole performance is completed. The end of the lower pallet B resting on the point of the tooth 1, prevents the wheel exerting its full force on the lock *a*, as in *Fig.* 1. The same effect is produced by the pallet laying on the tooth 5, by preventing the wheel from pressing on *b*; and thus the locking becomes the tightest possible. This Escapement may be much simplified by putting a spring with a pallet made in it, as in *Fig.* 5. instead of the lever-pallet and spiral-spring. The operation will be in other respects exactly the same, avoiding the friction of the pivots of the lever-pallet. This method I prefer,

Mr. I. Delafon's Watch Escapement.

Fig 5.

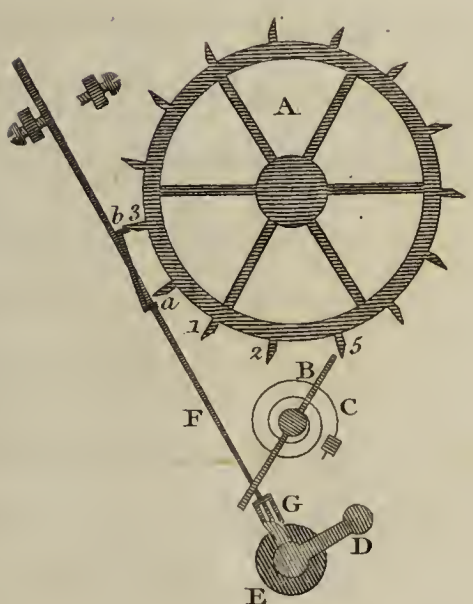


Fig. 3.

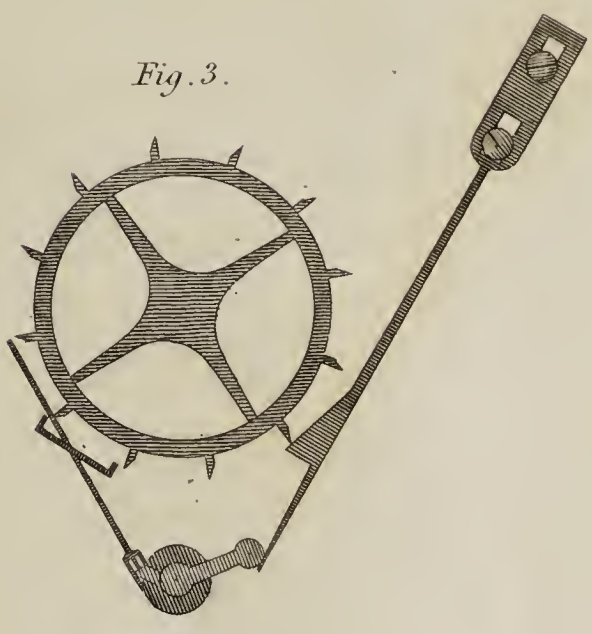


Fig. 1.

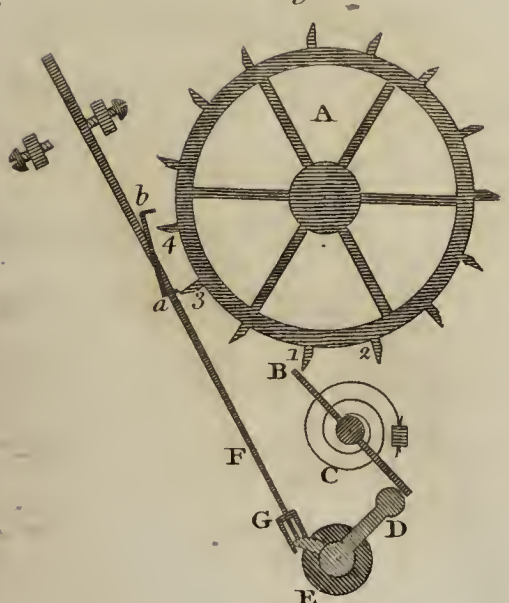


Fig. 2.

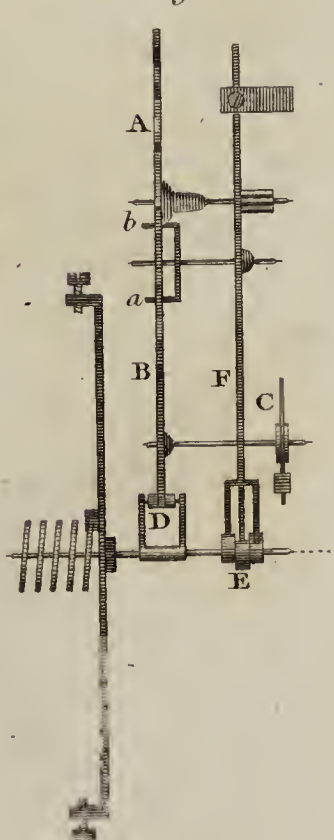
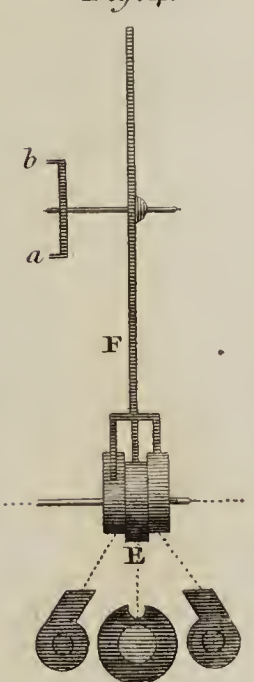


Fig. 4.



Lowry sculp.

fer for a piece to be in a state of rest, as a clock; but the disadvantage, from the weight of the spring in different positions, is obvious.

The locking may be on any two teeth of the wheel, as may be found most convenient.

JOHN DE LAFONS.

Mr. CHARLES TAYLOR.

PAPERS

IN

COLONIES AND TRADE.

COLONIES AND TRADE.

The following Communications on the production and application of Myrabolans, and their use as a substitute for Aleppo Galls, originated from the late Dr. Alexander Johnson, of Charlotte-Street, Portland-Place, who laid before the Society several other articles the products of the East Indies, with a view to the general advantage of Great Britain and her Colonies. Samples of the Myrabolans, and Specimens of the Colours they yield in dying, may be seen in the Repository of the Society.

On the 6th of February, 1793, Dr. Johnson laid before the Society samples of an article which he had received from Mr. Hellenus Scott, of Bombay, under

the name of East-India Galls; the Committee to whose examination they were referred, found them to be the larger species of Myrabolans, and that they possessed many qualities similar to the Gall-Nuts of the Levant, both the pulp and outer bark striking a good black colour with Martial Vitriol. The following letter was afterwards sent by Dr. Johnson to the Secretary.

Charlotte-Street, Portland-Place.

SIR,

THE India nut Myrabolan, like our Walnut, contains its tinging quality only in its fruits or parenchymous part. Its astringent essence, far stronger than that of our Walnut, strikes a strong black colour with the feculæ of iron, and fine browns with weaker solutions of copperas, while with allum it makes buff colours and their class.

Unac-

Unacquainted with the component parts of this nut, the tradesmen who were to use it required it to be coarsely ground, which, to satisfy them, was done, but proved wrong; on the one hand useless, and on the other loss of substance: a part of the fruit remaining on the grind-stones and clogging them, and another part became so adhesive to the broken shells and kernels, as scarcely to be disengaged from them by boiling.

From those and other circumstances, the idea arising that the fruity part alone was the useful, it became necessary to ascertain it by experiment. Three ounces of the nuts were therefore taken, put into an earthen pan, had warm soft water poured upon them, and with a slight cover were placed on the hobb of of a kitchen-range to stew. The evaporating water was replaced from a kettle usually upon that fire; and the next day, when examined and rubbed upon a board, the cover of the nut came easily off,

off, leaving only some pulp adhesive to the shell, which then was put again into the pan, and stewed in the same manner as before. The greater part of the pulp came off in the water; but some still sticking fast, the nuts, with the clearest of the last water, were then thrown into a small tub, and therein rubbed with a hearth brush or small broom, until they became quite clean. They were then dried, and the next day bruised and broken, and set again to stew as before; the decoction became of a light brown: which colour it kept unaltered, notwithstanding a frequent addition of a solution of iron filings, and of copperas.

I am, SIR,

Your most obedient servant,

ALEXANDER JOHNSON.

Mr. CHARLES TAYLOR.

The

The Committee sent Samples of the article to several principal dyers and callico-printers in different parts of the kingdom, for their opinion of its quality: the answers to which were, that the Myrabolans possessed very strong astringent powers, and would be a very desirable substitute for Galls, if the price of them was moderate. The Committee, therefore, declared to the Society, that the Myrabolans would be useful in various manufactures, and serve as a good substitute for Galls. The Society finding that the Myrabolans, though the product of a British Colony, paid heavier duties on importation than Galls sent from Turkey, presented a memorial to the Lords of the Treasury, stating that the importation of this and other useful products of our Settlements, are in effect discouraged by being subject to high duties, while articles from foreign countries, possessing similar properties, are admitted on more favourable terms; and

peti-

petitioning, that some steps might be taken to remove a discouragement so detrimental to the trade and manufactures of this country.

Although it does not appear that the petition of the Society has yet been complied with, there is reason to hope that so important a business will engage the attention of Government, and prevent large sums of money being sent to foreign states for similar articles.

The following is an abstract of a letter received by the Secretary, along with samples of two kinds of Myrabolans, in answer to an application made by him to Mr. William Pope, of Mahometpore, near Cassumbazer, in Bengal, for information on Myrabolans, and other products of India.

SIR,

SIR,

I AM induced to send you the following articles, being part of those mentioned in your letter to Mr. Pope, on which you required information.

Myrabolans, or a specimen of dried fruit which I suppose to be the article described under the name of Myrabolans. The Bengal name for this fruit is Hurrah P'hul, the largest being called Burrah Hurrah, and the smallest Choota Hurrah. They are sold in the common Bazar; the large at one rupee and a half per maund, or 82lb. avoirdupoise, and the small at four rupees per maund.

They are of a very astringent quality, and much used by the natives of India in fixing colours. They are also used for giving a black dye to leather, which is done by mixing the powder of the larger sort with a certain proportion of iron filings and water.

The

The smaller kind, from every information which I have been able to procure, is more used in medicine than dying, although from the acid astringency of both kinds, their properties must be nearly the same.

I am, SIR,

Your obedient servant,

J. MACHLACHLAN.

Council-House, Calcutta.

MR. CHARLES TAYLOR.

*** From the different experiments laid before the Society, this conclusion may be drawn, that Myrabolans will furnish various shades of buff colours, ash, brown, and black, according to the mordants employed; that all the dyes from them are very permanent, and that they have the quality of giving a fullness and firmness to the goods dyed therewith.

Some

Some hundred weights of them have been already used at Manchester, in stead of Galls, in the Turkey red-dye, and in other branches of business. The colouring matter of Myrabolans is easily extracted by boiling them, after they have been bruised in a mortar, without the trouble of separating the stone or kernel. In their common state and appearance, when imported, Myrabolans resemble dried plums, and are equal in value to half their weight of galls; but if the fruity or outer part could be sent from India in a dry state, without the stone or kernel, which is of little or no use, the article would be more valuable than Aleppo Galls.

June 4, 1801.

Five sorts of Myrabolans have been distinguished in the shops, all which have similar qualities; but the sort used in the above trials appears to be the fruit of the *Phyllanthus Emblica* of Linnæus, thus described, *Phyllanthus foliis pinnatis floriferis caule arboreo, fructu baccato.*

The SILVER MEDAL was this Session voted to ANDREW STEPHENS, Esq. of Keerpoy, in Bengal, for the following Communication on LAKE made by him from fresh STICK LACK, and sent to the Society with a quantity of the Lake, which is placed in their Repository.

Accounts of experiments made on this Lake by Dr. Bancroft are also annexed, which demonstrate that the Lake is a useful substitute for Cochineal in various cases, as may be seen from patterns of dyes prepared from it, and remaining for public inspection.

SIR,

AS Lake from the Stick-Lack just gathered from the trees, is an addition to the catalogue of dying-drugs, I consider it not unworthy the attention of

of the Society for the Encouragement of Arts, &c. and therefore beg leave to present a sample for their inspection, and humbly request they will be pleased to give it to some member of the Society experienced in the art of dying scarlet, to examine and report upon it.

I have reason to suppose that it is little inferior to Cochineal; and, as it may be afforded much cheaper, I hope it will be found a valuable article to the dyer.

But, should it even be found unequal to Cochineal, I am certain it will give a much better dye than can be obtained from Stick-Lack in England, as that article is liable to heat, and decay on the passage; and it suffers so much from age alone, that the dyers in Bengal cannot obtain colours so bright from Lack gathered only six or eight months, as they can from the fresh.

My situation is favourable for procuring the article. I have already delivered

18,000lb. weight to the Company; but no accounts of sales, or any reports thereon, have as yet reached the Board of Trade here.

As the extracting the colouring matter from Lack, and sending it home in the form of Lake, may justly be considered as a useful invention, and has been declared by Dr. Bancroft to be a *desideratum*, it will not, I trust, be deemed presumption in me, to hope for some mark of approbation from a Society of Gentlemen to whom the manufactures of England are already so much indebted.

I am, SIR,

Your most obedient servant,

ANDREW STEPHENS.
Assistant Surgeon, Bengal Establishment.

Keerpoy,
March 22, 1799.

To the SECRETARY of the
Society of Arts, &c.

The

The following letter from Dr. Bancroft to the Committee of Chemistry, was sent in answer to a request made by them on the 22d of February last. It states the natural history of Lacca, the mode of separating the colouring matter from it, and various methods of applying the colour for the purposes of Dyers; illustrated by specimens of woollen-cloth dyed by the Doctor, and which may be seen at the Society's Repository.

To the Committee of Chemistry of the Society of Arts, &c.

GENTLEMEN,

LACCA or Gum-lac is, as you doubtless know, produced abundantly by an insect of the Coccus genus, of which very satisfactory accounts have been given, first by Mr. James Kerr, in the Philosophical Transactions for the year 1781, and afterwards by Dr. Roxburgh,

in those of the year 1791. These insects, when young, place themselves upon the succulent extremities of the branches of certain shrubs growing in different places, and more especially upon the uncultivated mountains on both sides of the Ganges, where they soon produce and involve themselves in a spissid sub-pellucid liquid, which seems to glue them to the branches where they are placed; and, by a gradual accumulation of this liquid, each insect acquires, and becomes inclosed in a perfect cell, where, at maturity it appears like a small oval red bag, without life, and full of a *beautiful red fluid.* The whole mass of these cells, and of the insects contained therein, while adhering externally to the sticks or branches in question, is called *stick* lac; but when detached from the sticks, and garbled, it takes the name of *seed* lac: and this last being boiled in water to separate the colouring matter, then strained, and formed into thin

plates

plates (while liquified by heat), becomes *shell* lac, and constitutes the principal part of sealing-wax, when well made.

Dr. Roxburgh found that these insects gave to water a much more *beautiful red colour* while fresh, than after being dried; and thence concluded that it might be well for persons living where lac is most abundant, to endeavour to extract the colouring-matter while fresh and moist, in such a manner as to render it capable of being afterwards preserved without injury.

About three years before the publication of Dr. Roxburgh's paper, I had received from Mr. P—, a gentleman who had lately returned to this country from India, a sample of colouring-matter, which he called East-India cochineal, and which very nearly resembled that of Mexico, when it has been reduced to powder. With this substance I made several experiments, which convinced me that it was the colouring mat-

ter of lac, extracted most probably by hot water, and precipitated by alum. Of these experiments I gave an account in the first volume of my publication, upon the Philosophy of Permanent Colours.

On the 7th of July, 1796, Mr. Fleming, Inspector of Drugs at Calcutta, wrote a letter to the Bengal Board of Trade, of which the following is an extract, viz.

" Dr. Bancroft, in a very instructive work, which he has lately published on the subject of Dying, mentions as a *desideratum*, a method of extracting the colouring matter of lac, and thinks that if it could be formed into Lake, and sent home in that state, it would be a far preferable method to that of sending the stick lac. Encouraged by so good an authority, I herewith send for your inspection two bottles of a preparation which I have received from Mr. Stephens, at Keerpoy, and which appeared

to

to me to be exactly what the Doctor desires. Mr. Stephens informs me, that he prepared it from *fresh* lac, by a method discovered by himself; and that if it should be found to answer on trial, he will be able to provide a considerable quantity of it every year. I therefore beg leave to recommend that the accompanying sample may be sent home by the ship Dart, with a request to the Honourable Court of Directors, that it may be forwarded to Dr. Bancroft, for his opinion of its value," &c.

This recommendation the Board of Trade thought proper to adopt, and transmitted the same with the samples in question by the Dart, as appears by their letter of the 9th of July, 1796, to the Court of Directors, by whose order they were afterwards forwarded to me, for the purpose mentioned by Mr. Fleming. With these samples I made some successful experiments, and gave such an account of them, as, joined to the

then high price of Cochineal, induced the East-India Company, as I have been informed, to purchase a considerable quantity of the Lake, or preparation in question, from Mr. Stephens, and at a very handsome price; though I believe few or no steps have been taken here to bring it into use among the Dyers, Morocco-leather manufacturers, Paper-stainers, &c.

Mr. Stephens having lately addressed the Society of Arts, &c. on the subject of this Lake, and sent them a sample of it, and I having been requested at a Committee of Chemistry, to whom Mr. Stephens's communication was referred, to repeat my experiments with a part of the sample sent to the Society, I have done so; and now beg leave to offer the Committee some specimens of colours dyed therewith, and an account of the means and process by which they were so dyed.

In

In the first volume of my publication on Permanent Colours, I have described and recommended a method of dying the scarlet colour from Cochineal upon a *new* principle; and this method has enabled me to produce a better scarlet with Mr. Stephens's Lake, than I have yet been able to do by the ordinary method. Perhaps my failures in this respect may be owing to a cause which I did not suspect until very lately, and the existence or non-existence of which I have not since had leisure to ascertain, though I hope soon to do it. In the mean time I shall endeavour as shortly as possible to enable the Committee to understand the nature and principle of the new method just mentioned. I had found, more than twelve years ago, that the *true* or *natural* colour of Cochineal when given to wool by dying, with the common solution, or nitro-muriate of tin, which the Dyers invariably employ for dying scarlet, was not a *scarlet*, but a bright

a bright *rose* colour, as N° I. of the samples which accompany this paper; and that in the usual process it only became a scarlet from the chemical action of the acid of a considerable portion of tartar, which the Dyers invariably use; though without knowing the particular effect resulting from it.

N° II. is a sample of a very beautiful *scarlet*, dyed by the successor of the late Mr. Nash, in Gloucestershire, and like all *true* scarlets is a *compound* colour, of about three portions of the rose of N° I. and one portion of pure yellow; though in this instance the effect or colour results not from the addition of a *foreign yellow*, but from such a conversion of the cochineal rose colour towards the yellow, as is equivalent to about one fourth of the whole. Reflecting on this fact, and considering the great difference in price between the colouring-matter of Cochineal and that of the purest known *yellows*, I concluded that a great

great saving of expense might be obtained by employing the former without tartar, so as only to produce that portion, which is necessary, of the *rose* colour, and superadding a suitable portion of yellow from some of the cheaper yellow dying-drugs; among which the *quercitron-bark* naturally occurred to me as producing, with the solutions of tin, one of the purest and brightest yellow colours; of which a sample may be seen at N° III. Upon this principle the sample N° IV. has been dyed; by first giving the cloth a yellow ground, with a suitable quantity of the usual solution, or nitre-muriate of tin, and of the quercitron-bark, and then superadding the cochineal *rose* colour, by dying it in the usual way with cochineal, and a like solution of tin as for a scarlet; taking care only to *omit the tartar*, which would otherwise have carried the colour so much farther towards the *yellow hue* as to produce an *aurora*.

It

It is upon this principle that the samples N° V. and N° VI. have been dyed, from Mr. Stephens's *Lac-Lake*. Both were first dyed yellow, with the quercitron-bark, as at N° III. and afterwards dyed with the Lake: but for N° V. I employed, along with the Bark and Lake, a suitable portion of the solution of tin, commonly used by scarlet-dyers in the nitro-muriate of that metal: and for N° VI. I substituted the murio-sulphate, which I have in my first volume recommended as cheaper, and in some respects preferable, to the nitro-muriate of tin. I must, however, observe, that the colouring-matter of Mr. Stephens's Lake, having, as I believe, been precipitated by alum, cannot be disengaged from the aluminous earth, and dissolved even by boiling-water alone. Pure pot-ash, or pure soda, should be added in nearly an equal quantity to the Lake employed, in order to produce a complete separation, and solution of the colouring-matter,

matter; and the water should be made hot, and kept nearly at a boiling heat for half an hour; after which the clear liquor may be decanted from the sediment.

It will be perceived that the samples N° V. and N° VI. are a little less vivid and beautiful than the Gloucestershire scarlet N° II. or that dyed, or rather compounded, from cochineal and quercitron-bark N° IV. But it is probable that the colours from Lac-Lake may prove rather more durable than those from cochineal, and in that way they may compensate for their little inferiority in brightness. It is difficult to measure the quantity or amount of the colouring-matter afforded by the Lac-Lake, with accuracy, in experiments made upon so small a scale as mine; but I think there is reason to conclude, that four pounds of the Lake will yield about as much colour as one pound of fine cochineal.

I have

I have the honour to be, very respectfully,

GENTLEMEN,

Your most obedient servant,

EDWARD BANCROFT.

May 29, 1801.

P. S. Mr. Stephens has not explained the means or process employed by him to produce the Lake in question. I am, however, convinced, that after extracting the colouring-matter by hot water, he has precipitated it by alum; which appears to me not to be the most eligible method of obtaining what is wanted from the Lac.

Probably the colouring-matter might be more advantageously procured by extracting it with the help of boiling-water, and afterwards evaporating the decoction to complete dryness, in the ways, and with the precautions, usually employed for the like purposes. But if it

it should be found expedient to employ any means of precipitation, I think some of the solutions of tin, which have been found suitable for dying scarlet, would prove more efficacious than alum in this way; because the calx of tin is of greater specific gravity than alumine: and it would moreover prove advantageous to the scarlet dye, because, by adding any suitable acid, this calx, and the colouring-matter precipitated by it, might be redissolved in a state fit for *immediate use*, without the necessity, which now exists, of employing an alkali, to detach the colouring-matter from the aluminous precipitant; and also without the danger of redissolving a portion of alumine along with the colouring-matter of the Lac, by which the scarlet might probably be rendered less vivid than it would be with a basis obtained wholly from tin.

*** Ex-

*** Experiments made by other persons confirm Dr. Bancroft's observations. It appears that the effects of this Lake for dying cotton-cloth, staining leather, and printing upon paper, are analogous to those of cochineal, but require three or four times the weight, to produce similar intensity of colour.

The price of the article is such as will probably bring this Lake into general use, among Painters, Manufacturers, Printers, and Dyers.

REWARDS

BESTOWED BY THE

SOCIETY,

From October, 1800,

To June, 1801.

REWARDS

BESTOWED IN

AGRICULTURE.

Class 25. TO HENRY VERNON, Esq. of Hilton-Park, in Staffordshire, for having planted eleven thousand six hundred English Elms, the GOLD MEDAL. See page 69.

Class 49. To Mr. THOMAS SELBY, of Otford Castle, in Kent, for having planted twenty-one acres with Osiers, THIRTY GUINEAS. See page 75.

Class 67. To THOMAS JOHNES, Esq. of Hafod, in Cardiganshire, for extensive Plantations of Timber-trees, the GOLD MEDAL. See page 78, and Preface.

Class 88. To Mr. Robert Brown, of Markle, in Scotland, for cultivating one hundred and forty-five acres of Spring-Wheat, Twenty Guineas. See page 81.

Class 93. To the Rev. T. C. Munnings, of East Dereham, in Norfolk, for comparative experiments in the growth of Turnips, the Silver Medal and Ten Guineas. See page 147.

Class 103. To Mr. Thomas Fogg, of Bolton, Lancashire, for improving fifty acres and a half of Land lying waste, the Gold Medal. See page 105.

To Mr. John Palmer, of Maxstock Castle, near Coleshill, in Warwickshire, for Harvesting Corn in Wet Weather, the Silver Medal. See page 99.

To

To Mr. John Horridge, of Raikes, Lancashire, for his preparation and application of Manures, the Silver Medal. See page 183.

To Nicholas Ashton, Esq. of Woolton-Hall, in Lancashire, for planting one hundred and thirty-three acres of Waste Moor Land, the Gold Medal. See page 169.

To Mr. William Lester, of Northampton, for an implement in husbandry called by him a Cultivator, the Silver Medal. See page 142.

To Thomas Andrew Knight, Esq. of Elton, near Ludlow, for a Drill Machine for sowing Turnip-seed, the Silver Medal. See page 123.

IN CHEMISTRY.

Class 147. To Samuel Bentham, Esq. Queen's-Square, for preserving Fresh Water Sweet during long Voyages, the Gold Medal. See page 191.

IN POLITE ARTS.

Class 185. To Mr. T. Kilburn, of Wallington, for a Drawing of Flowers, the Silver Medal.

Class 187. To Miss Sarah Matilda Parry, of Bath, for an original Sketch from Nature, being a View on the River Wye, the Silver Medal.

Class 189. To Mr. William Mulready, of Langley-Street, for a Drawing of Outlines, the Greater Silver Pallet.

Class

Class 190. To Mr. Peter Joseph Bone, Hanover-Street, for a Drawing of Outlines, the Lesser Silver Pallet.

Class 191. To Mr. Francis John Sarjeant, Berkeley-Square, for a View from the Red-Lane, near Reading, in Berkshire; being an original Drawing from Nature, the Greater Silver Pallet.

Class 194. To Mr. H. Moses, of Greenwich, for an Historical Drawing of the Continence of Scipio, the Greater Silver Pallet.

To Miss Louisa Charlotte Lloyd, of Aston, in Staffordshire, for a Drawing of the Head of Galen, from a Cast in Plaster, the Silver Medal.

To Miss Mary Smirke, Charlotte-Street, Fitzroy-Sq.

for a Painting, being a View from Nature, taken near Finchley, the GOLD MEDAL.

To Miss BEAUCHAMP, of Langley Park, for a Copy of a Painting from Salvator Rosa, the SILVER MEDAL.

To Miss ANDRAS, of Pall-Mall, for two Models, being her Royal Highness Princess Charlotte, and Lord Nelson, taken from life, the GREATER SILVER PALLET.

To Mrs. REBECKAH LOWRY, of Titchfield-Street, for two Paintings on Glass, the SILVER MEDAL.

IN MANUFACTURES.

Class 207. To Mr. THOMAS WILLMOT, of Shoreham, Kent, for Paper made from raw Vegetable Substances, TWENTY GUINEAS. See page 235.

IN

IN MECHANICKS.

Class 212. To Mr. Robert Hayes, of Wapping, for taking three Whales by the Gun Harpoon, Ten Guineas. See page 262.

Class 213. To Mr. Richard Phillips, of Bristol, for his improved Mode of driving Bolts into Ships, Forty Guineas. See page 269.

Class 222. To Mr. Field Evans, of Pool Quay, Montgomeryshire, for discovering a Quarry of Burr-stone proper for Mill-Stones, Fifty Pounds. See page 280.

To Mr. Thomas Arkwright, of Kendal, for a Machine for raising Minerals, Twenty-Five Guineas. See page 276.

To

To Mr. Henry Sarjeant, of Whitehaven, in Cumberland, for a Machine for raising Water, the Silver Medal. See page 255.

To Mr. Thomas Ghent, of Homerton, for an improved Crane, Fifteen Guineas. See page 294.

To Mr. William Bullock, of Portland-Street, for an improvement in Drawback Locks, Fifteen Guineas. See page 290.

To Mrs. Besant, Brompton-Row, for an improved Water-Wheel, Ten Guineas. See page 265.

To Mr. De Lafons, for a Watch Escapement, Thirty Guineas. See page 331.

To Mr. Garnet Terry, of the Bank, for a Steel Mill for grinding hard Substances, the

the SILVER MEDAL. See page 287.

IN COLONIES AND TRADE.

To ANDREW STEPHENS, Esq. of Calcutta, for making 18,000 lb. of Lake from Stick-Lack, the SILVER MEDAL. See page 352.

PRESENTS

RECEIVED BY THE

SOCIETY,

SINCE THE PUBLICATION OF THE EIGHTEENTH VOLUME OF THESE TRANSACTIONS.

With the Names of the Donors.

The Royal Society.

THE Second Part of the 89th, and the First, Second, and Third Parts of the 90th Volume of the Philosophical Transactions.

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Three Numbers of the Transactions of that Society.

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Samples of Chicoree Seed, of Chicoree Roots, in different states, and of Coffee prepared from them.

A CATALOGUE

OF THE

MODELS AND MACHINES

Received since the Publication of the Eighteenth Volume of the Society's Transactions, with the Numbers as they are arranged, in the Class to which they belong.

AGRICULTURE. CLASS I.

No. LXXXVII. A MODEL of a Drain-Plough, by his Grace the Duke of Bridgewater. See Page 117.

LXXXVIII. A Drill-Machine for Sowing Turnip-Seed, by Thomas Andrew Knight, Esq. See Page 123.

LXXXIX.

LXXXIX. A Model of a Cultivator for pulverizing ploughed Fallows. See Page 142.

XC. A Drill-Machine for Sowing Turnip-Seed, by the Rev. T. C. Munnings. See Page 147.

XCI. A Model of an Augre, or Peat-Borer, for draining Boggy Land, by Thomas Eccleston, Esq. See Page 165.

MECHANICKS. CLASS IV.

CLXXXIV. A Model of a Water-Wheel, by the late Mr. Besant. See Page 265.

CLXXXVI. Two Models of Machines for driving Bolts into Ships, by Mr. R. Phillips. See Page 269.

CLXXXVII. A Model of a Machine for raising Ore from Mines, by Mr. Thomas Arkwright. See Page 276.

CLXXXVIII. A Model of a Mill for grinding Hard Substances, by Mr. Garnet Terry. See Page 277.

CLXXXIX. A Drawback Lock for House Doors, by Mr. William Bullock. See Page 290.

CXC. A Crane for raising and delivering heavy Bodies See Page 294.

CXCI. A Model of a Stove for Ventilation, and a Model of a Sash Frame, recommended for Hospitals, by Sir G. O. Paul, Bart. See Page 299.

CXCII. An Escapement for Watches, by M. John De Lafons. See Page 331.

A LIST

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AND

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A

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Printed by W. and C. Spilsbury, No. 57, Snowhill, London.

ERRATA.

Page 302, line 18, for *does not exiſt*, read *does exiſt*.
—— 303, — 23, for *intercourſes*, read *intercourſe*.
—— 304, — 23, for *fevers*, read *fever*.
—— 310, — 13, for *principles*, read *principle*.
—— 311, — 5, for *theſe*, read *the*.
—— —, — 9, for *priſons*, read *priſon*.
—— 312, — 12, for *openneſs*, read *openings*.
—— 313, — 8, for *particularly*, read *particular*.
—— 316, — 15, for *dyſentery*, read *dyſenteric*.
—— 319, — 3, for *that the draft*, read *to accelerate the draft*.
—— —, — 6, dele *is accelerated*.
—— 329, — 16, for *edges*, read *ledges*.

Society for the Encouragement of Arts, Manufactures, and Commerce.

ADELPHI, Jan. 14, 1802.

THE SOCIETY for the ENCOURAGEMENT of ARTS, MANUFACTURES, and COMMERCE, wishing to encourage the growth of HEMP for the use of the Navy, in certain parts of Scotland, comprehending the whole county of Argyle; that part of Perthshire, situate to the North of the river Tay, and West of the Military Road (See Ainslie's Map of Scotland) leading from Logierait to the county of Inverness; and such other parts of Scotland as lie North of Invernessshire—offers to the Person who shall sow with Hemp, in drills at least eighteen inches asunder, the greatest quantity of Land in the above-mentioned district, not less than Fifty Acres, statute measure, in the year 1802, and shall at the proper season cause to be plucked the Summer-Hemp (or Male Hemp, bearing no seed), and continue the Winter-Hemp (or Female Hemp, bearing seed) on the ground, until the seed is ripe — the GOLD MEDAL, or FIFTY GUINEAS.

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By Order of the Society,

CHARLES TAYLOR, Sec.